

# SAFETY.CAT.COM™

## MAINTENANCE INTERVALS

Operation and Maintenance  
Manual Excerpt

# Operation and Maintenance Manual

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## **963B Track-Type Loader**

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9BL1-Up (Machine)

i01649245

## Maintenance Interval Schedule

**SMCS Code:** 7000

**Note:** All safety information, warnings, and instructions must be read and understood before you perform any operation or any maintenance procedure.

Before each consecutive interval is performed, all of the maintenance requirements from the previous interval must also be performed.

### When Required

|   |     |
|---|-----|
| Battery - Recycle .....   | 90  |
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| Cab Air Filter - Clean/Replace .....                                | 91  |
| Circuit Breakers - Reset .....                                      | 92  |
| Engine Air Filter Primary Element - Clean/Replace .....             | 96  |
| Engine Air Filter Secondary Element - Replace ...                   | 98  |
| Engine Air Precleaner - Clean .....                                 | 98  |
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| Fuel System - Prime .....   | 104 |
| Fuses - Replace .....   | 108 |
| Oil Filter - Inspect .....  | 117 |
| Radiator Core - Clean .....   | 119 |
| Radiator Pressure Cap - Clean/Replace .....                         | 119 |
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| Window Wipers - Inspect/Replace .....                               | 126 |

### Every 10 Service Hours or Daily

|                           |     |
|---------------------------|-----|
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|---------------------------|-----|

### Every 10 Service Hours

|   |     |
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| Bucket Lower Pivot Pin - Lubricate .....                  | 90  |
| Cooling System Level - Check .....                        | 95  |
| Engine Oil Level - Check .....                            | 99  |
| Final Drive - Inspect .....                               | 103 |
| Fuel Tank Water and Sediment - Drain .....                | 107 |
| Hydraulic System Oil Level - Check .....                  | 111 |
| Hydrostatic Transmission Gear Box Oil Level - Check ..... | 114 |
| Indicators and Gauges - Test .....                        | 115 |
| Pump Drive Oil Level - Check .....                        | 118 |
| Track Adjustment - Check .....                            | 122 |
| Walk-Around Inspection .....                              | 123 |
| Windows - Clean .....                                     | 125 |

### Every 50 Service Hours

|                                    |     |
|------------------------------------|-----|
| Idler Swing Link - Lubricate ..... | 115 |
|------------------------------------|-----|

### Every 50 Service Hours or Weekly

|                            |     |
|----------------------------|-----|
| Track Pins - Inspect ..... | 122 |
|----------------------------|-----|

### Every 100 Service Hours or 2 Weeks

|                                       |     |
|---------------------------------------|-----|
| Loader Linkage Pins - Lubricate ..... | 116 |
| Multipurpose Bucket - Lubricate ..... | 116 |

### Every 250 Service Hours or Monthly

|   |     |
|---|-----|
| Air Conditioner - Test .....                            | 87  |
| Air Conditioner Belt - Inspect/Adjust/Replace .....     | 87  |
| Alternator and Fan Belts - Inspect/Adjust/Replace ..... | 88  |
| Battery - Inspect .....                                 | 89  |
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| Engine Oil and Filter - Change .....                    | 100 |
| Engine Valve Lash - Check .....                         | 101 |
| Equalizer Bar End Pins - Lubricate .....                | 101 |
| Equalizer Bar Pins - Lubricate .....                    | 102 |
| Final Drive Oil Level - Check .....                     | 104 |
| Fuel System Secondary Filter - Replace .....            | 106 |
| Pivot Shaft Oil Level - Check .....                     | 117 |
| Recoil Piston - Lubricate .....                         | 119 |
| Steering Linkage - Lubricate .....                      | 120 |
| Track Adjustment - Adjust .....                         | 121 |
| Water Pump Belt - Inspect/Adjust/Replace .....          | 124 |

### Every 500 Service Hours or 3 Months

|  |     |
|--|-----|
| Engine Crankcase Breather - Clean .....                              | 99  |
| Fuel System Primary Filter (Water Separator) Element - Replace ..... | 105 |
| Fuel Tank Cap and Strainer - Clean .....                             | 107 |

### Every 1000 Service Hours or 6 Months

|   |     |
|---|-----|
| Hydraulic System Oil Filter - Replace .....         | 110 |
| Hydrostatic Transmission Oil Filter - Replace ..... | 112 |

### Every 2000 Service Hours or 1 Year

|                                     |     |
|-------------------------------------|-----|
| Hydraulic System Oil - Change ..... | 109 |
|-------------------------------------|-----|

### Every 2000 Service Hours or 1 Year

|  |     |
|--|-----|
| Final Drive Oil - Change .....                       | 103 |
| Hydrostatic Transmission Gear Box Oil - Change ..... | 113 |
| Pump Drive Oil - Change .....                        | 117 |
| Track Roller Frame - Inspect .....                   | 123 |

### Every 3000 Service Hours or 2 Years

|   |    |
|---|----|
| Cooling System Coolant (DEAC) - Change .....              | 93 |
| Cooling System Extended Life Coolant Extender - Add ..... | 95 |

Cooling System Water Temperature Regulator -  
Clean/Replace ..... 95

**Every 6000 Service Hours or 4 Years**

Cooling System Extended Life Coolant - Change .. 94

i01029831

## Air Conditioner - Test

SMCS Code: 7320-081

### WARNING

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas can cause bodily harm or death. Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

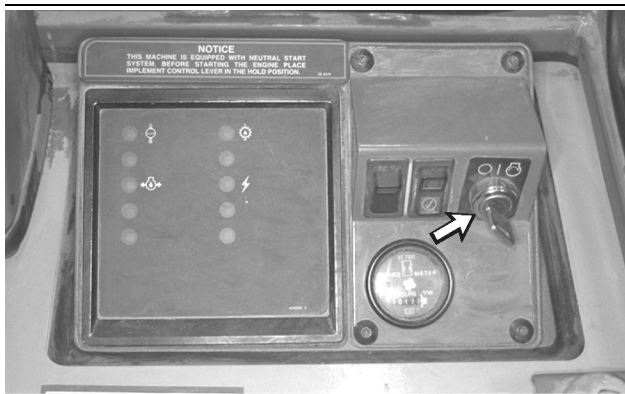


Illustration 192

g00508963

1. Start the engine. Operate the engine at HIGH IDLE.

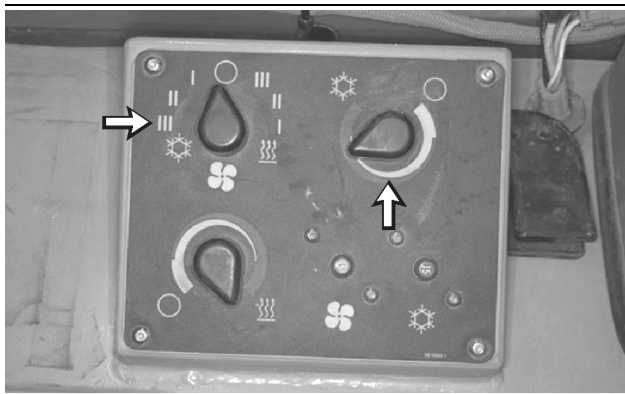


Illustration 193

g00511723

2. Set the air conditioner control for maximum cooling. Set the fan control knob to the HIGH position.
3. To stabilize the air conditioning system, run the air conditioning system for two minutes.

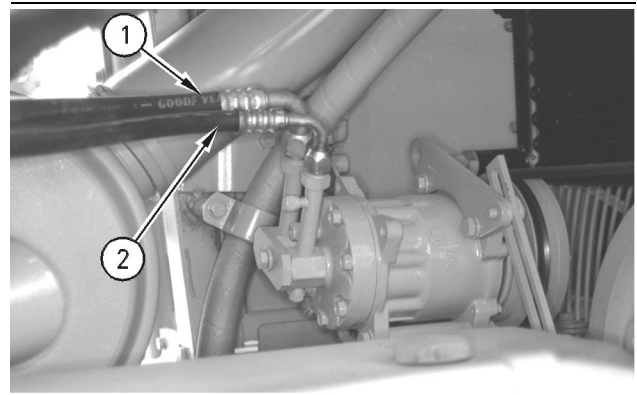


Illustration 194

g00530401

4. Check for refrigerant in the system. Feel suction line (1) and discharge line (2).

If the system contains refrigerant, the discharge line is warmer than the suction line.

If the system does not contain refrigerant or the system contains only a small amount of refrigerant, poor cooling will result.

5. Stop the engine. Inspect the air conditioner belt. Refer to Operation and Maintenance Manual, "Air Conditioner Belt - Inspect/Adjust/Replace" for additional information.

i01029934

## Air Conditioner Belt - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510

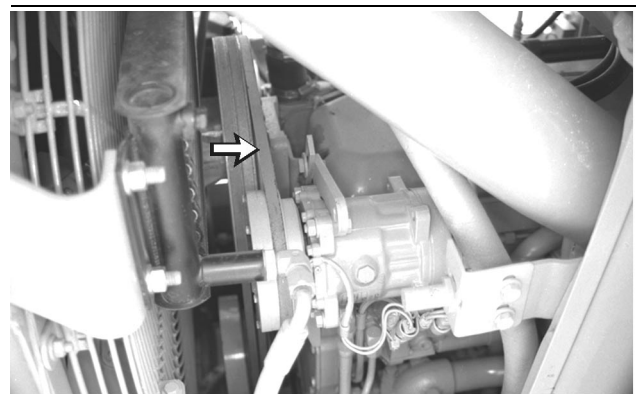


Illustration 195

g00530457

1. Inspect the condition of the compressor drive belt. The belt should deflect 14 to 20 mm (.56 to .81 inch) under 110 N (25 lb) of force.

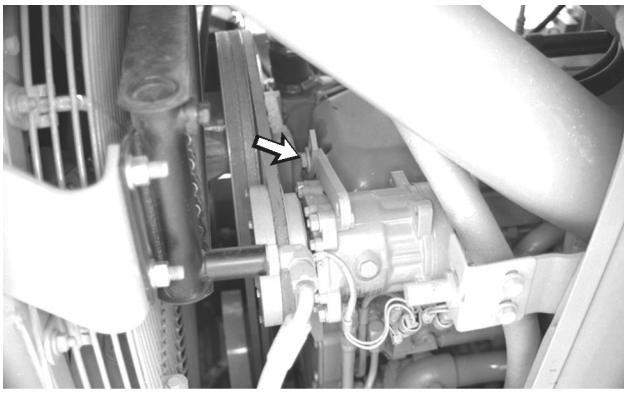


Illustration 196

g00530459

2. Loosen the compressor mounting bolt and the adjusting bracket bolt.
3. To achieve the correct belt tension, move the compressor inward or move the compressor outward. Tighten the compressor mounting bolt and the adjusting bracket bolt. Recheck the belt adjustment.
4. If necessary, repeat Steps 2 and 3. Check the cab air filters. If necessary, clean the filter elements.
5. If poor cooling persists, turn off the air conditioner. Stop the engine. Consult your Caterpillar dealer for air conditioner system service, if necessary.

i01029320

## Alternator and Fan Belts - Inspect/Adjust/Replace

**SMCS Code:** 1357-025; 1357-040; 1357-510



Illustration 197

g00529104

1. Open the rear engine compartment access door that is located on the left side of the machine.

**Note:** Even if only one belt is worn or damaged, replace the belts in sets.

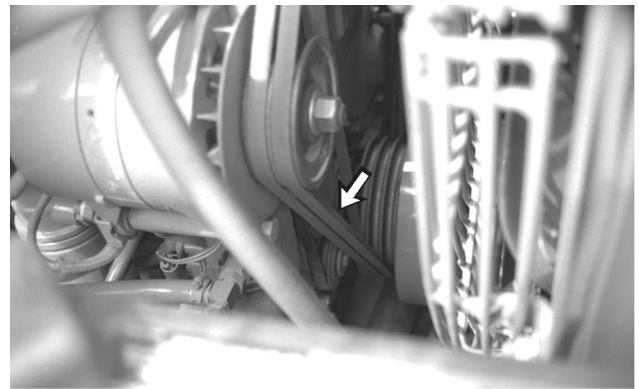


Illustration 198

g00530143

2. Inspect the condition of the fan drive belt and the alternator belt. Measure the belt deflection. The belts should deflect 14 to 20 mm (.56 to .81 inch) under 110 N (25 lb) of force.

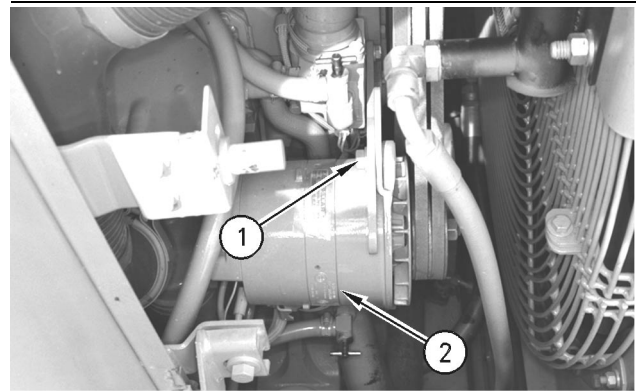


Illustration 199

g00530146

3. Loosen adjusting locknut (1).
4. To achieve the correct belt adjustment, move the alternator (2) inward or move the alternator outward, as required.
5. Tighten adjusting locknut (1) to a torque of 50 N·m (37 lb ft) when the correct tension is achieved.
6. If new belts are installed, check the belt adjustment after 30 minutes of engine operation.
7. Close the access door.

i01028564

## Backup Alarm - Test

**SMCS Code:** 7406-081



Illustration 200

g00529664

The backup alarm is located at the rear of the machine behind the radiator grill.

Turn the engine start switch to the ON position in order to perform the test.

Move the speed/direction control lever to the REVERSE position.

The backup alarm should sound immediately. The backup alarm should continue to sound until the speed/direction control lever is moved to the NEUTRAL position or to the FORWARD position.

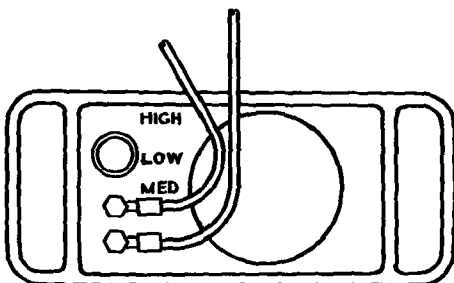


Illustration 201

g00037563

A three-position switch is at the rear of the alarm. The three positions on the switch are high, low, and medium. The three-position switch regulates the volume of the alarm.

The alarm is set from the factory at the highest sound level. The setting should remain on high, unless the job site requires a lower sound level.

i01026617

## Battery - Inspect

**SMCS Code:** 1401-040

Tighten the battery retainers on all batteries at every 1000 hour interval.

Perform the following procedure at every 1000 hour interval.



Illustration 202

g00528139

1. Open the rear engine access cover on one side of the machine. Lower the battery access cover at the rear of the machine.



Illustration 203

g00528145

2. Clean the top of the battery with a clean cloth. Keep the terminals clean and coated with petroleum jelly. Install the terminal covers after you coat the terminals.
3. Close the battery access cover.
4. Repeat Steps 1 through 3 for the battery that is on the opposite side of the machine.

i00637582

## Battery - Recycle

**SMCS Code:** 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i00637583

## Battery, Battery Cable or Battery Disconnect Switch - Replace

**SMCS Code:** 1401-510; 1402-510; 1411-510

1. Turn the engine start switch key to the OFF position. Turn all of the switches to the OFF position.
2. Turn the battery disconnect switch to the OFF position. Remove the key.
3. Disconnect the battery cable at the battery disconnect switch. The battery disconnect switch is connected to the machine frame.
4. Disconnect the negative battery cable at the battery.
5. Make necessary repairs or replace the battery.
6. Connect the negative battery cable at the battery.
7. Connect the battery cable at the battery disconnect switch.
8. Install the key and turn the battery disconnect switch to the ON position.

i01033528

## Bucket Lower Pivot Pin - Lubricate

**SMCS Code:** 6108-086-PN



Illustration 204

g00289467

Lubricate two fittings. There is one fitting on each side of the bucket.

i01027107

## Bucket Teeth and Cutting Edges - Inspect/Replace

**SMCS Code:** 6801-040; 6801-510; 6822-040; 6822-510

### **WARNING**

**Personal injury or death can result from bucket falling.**

**Block the bucket before changing bucket tips.**

1. Raise the bucket and block up the bucket. Only block up the bucket to a sufficient height for removing the bucket tips.
2. Shut off the engine.



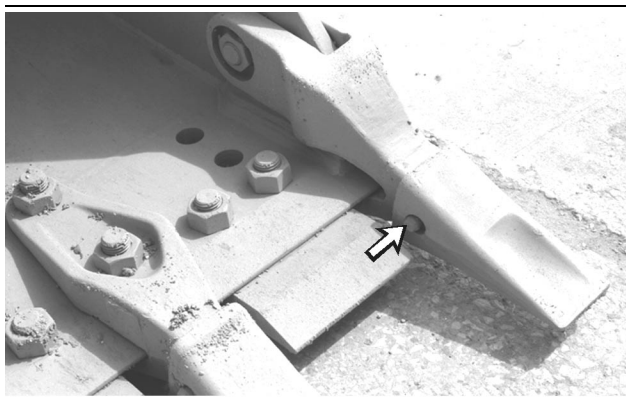


Illustration 205

g00528688

3. Drive the pin out of the bucket tip from the retainer side of the bucket tip. Remove the bucket tip and the retainer.
4. Clean the adapter, the pin, and the retainer. Install the retainer in the groove.
5. Install a new bucket tip over the retainer in the runner position or in the digger position.
6. Drive the pin through the retainer, through the adapter, and through the bucket tip from the opposite side of the retainer.
7. To change the cutting edges, remove the two bolts and two nuts. Then, remove the cutting edge.
8. Install the new cutting edge, the two bolts and two nuts.
9. Start the engine.
10. Raise the bucket and remove the supporting block. Lower the bucket to the ground.

i01027465

## Cab Air Filter - Clean/Replace

**SMCS Code:** 7342-070-FI; 7342-510-FI

**Note:** Clean filters more often in dusty conditions.



Illustration 206

g00528914

1. Open the engine access door on the left side of the machine.

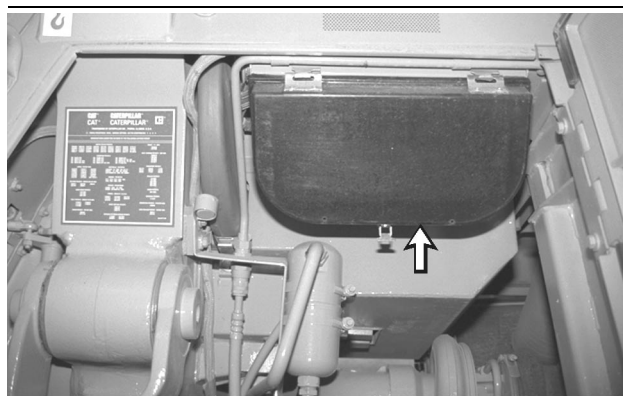


Illustration 207

g00512358

2. Open the filter cover in order to remove the filter elements.

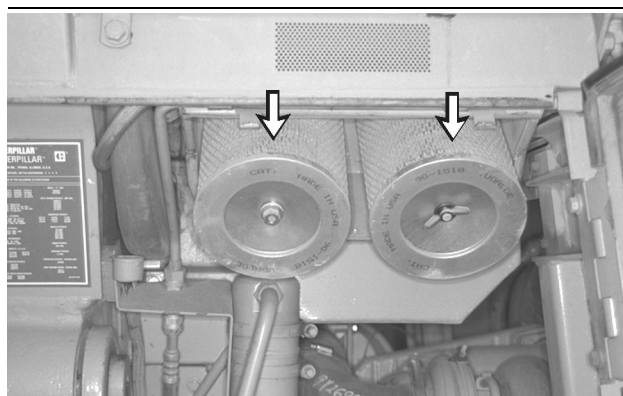


Illustration 208

g00512359

3. Remove the filter elements. Install new filter elements or clean the filter elements. Clean the filter elements with pressure air, or wash the filter elements in warm water and a nonsudsing household detergent. Rinse in clean water and air dry thoroughly. Replace the filter cover.

4. Close the access door for the engine compartment.

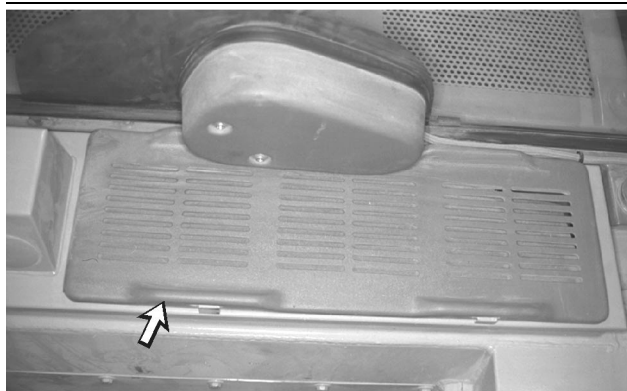


Illustration 209

g00512360

5. Remove the filter element cover that is located in the operator's compartment.
6. Remove the filter element. Clean the filter element with pressure air, or wash the filter element in warm water and a nonsudsing household detergent.
7. Rinse in clean water and air dry thoroughly.
8. Install the filter element. Install the filter cover.

i01026720

## Circuit Breakers - Reset

**SMCS Code:** 1417-529; 1420-529

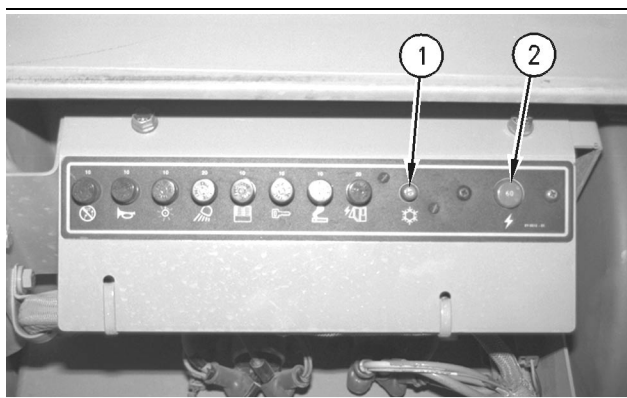


Illustration 210

g00512386



**Circuit Breaker Reset** – Push in the button in order to reset the circuit breaker. If the electrical system is working properly, the button will remain depressed. If the button does not remain depressed, check the appropriate electrical circuit. Repair the electrical circuit, if necessary.



**Air Conditioning Reset (1) – 40 Amp**



**Alternator Reset (2) – 50 Amp**

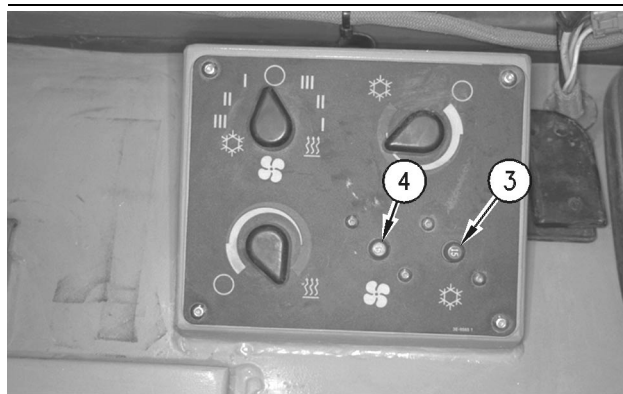


Illustration 211

g00512537

Additional circuit breakers for the air conditioning and the fan are in the operator's compartment.



**Air Conditioning (3) – 15 Amp**



**Fan (4) – 15 Amp**

i01029247

## Cooling System Additive (DEAC) - Add

**SMCS Code:** 1352-044

See the appropriate topics in your machine's Operation and Maintenance Manual for all cooling system requirements.

Use **8T-5296** Test Group to check the concentration of the coolant.

If necessary, add supplemental coolant additive.

**Reference:** Refer to Operation and Maintenance Manual, "Refill Capacities" for additional information.

i01033591

#### NOTICE

Do not exceed the recommended six percent supplemental coolant additive concentration. Excessive supplemental coolant additive concentration can form deposits on the higher temperature surfaces of the cooling system, reducing the engine's heat transfer characteristics. Reduced heat transfer could cause cracking of the cylinder head and other high temperature components. Excessive supplemental coolant additive concentration could also result in radiator tube blockage, overheating, and/or accelerated water pump seal wear. Never use both liquid supplemental coolant additive and the spin-on element (if equipped) at the same time. The use of those additives together could result in supplemental coolant additive concentration exceeding the recommended six percent maximum.

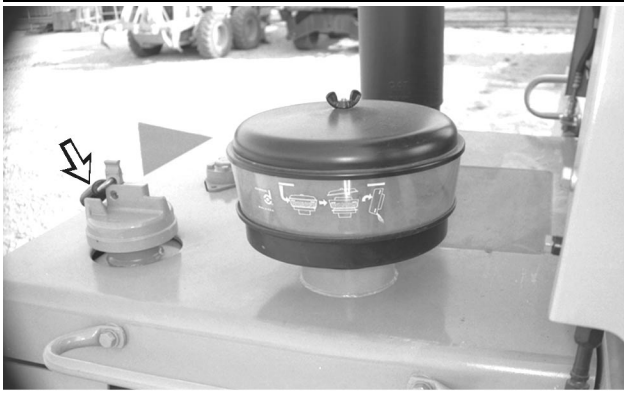


Illustration 212

g00528755

1. Slowly loosen the filler cap in order to relieve the pressure. Remove the cap.
2. Add supplemental coolant additive. Drain some coolant from the radiator into a suitable container in order to allow space for the extra coolant additive.

**Note:** Always discard drained fluids according to local regulations.

3. Add 0.24 L (.50 pint) of supplemental coolant additive for every 38 L (10 US gal) of engine cooling capacity.

**Note:** The engine cooling capacity of the 973 is 51 L (13.4 US gal).

4. Inspect the filler cap gasket. Replace the filler cap if the gasket is damaged.
5. Install the filler cap.

## Cooling System Coolant (DEAC) - Change

**SMCS Code:** 1352-044; 1395-044

#### NOTICE

Make sure you read and understand the information in the topics Safety and Cooling System Specifications for all information pertaining to water, antifreeze and supplemental coolant additive requirements before you proceed with maintenance of the cooling system.

Drain the coolant whenever the coolant is dirty or whenever foaming is observed.

The radiator cap is located in the top of the hood.

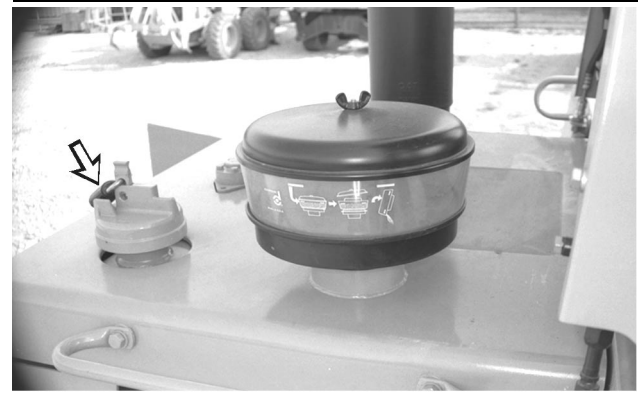


Illustration 213

g00528755

Open the engine compartment access cover on the right side of the machine. Use the cover as a step in order to attain access to the radiator filler cap. Maintain a three-point contact with the machine. (A three-point contact consists of two feet and one hand or of one foot and two hands.)

1. Slowly loosen the radiator cap in order to relieve system pressure. Remove the radiator cap.

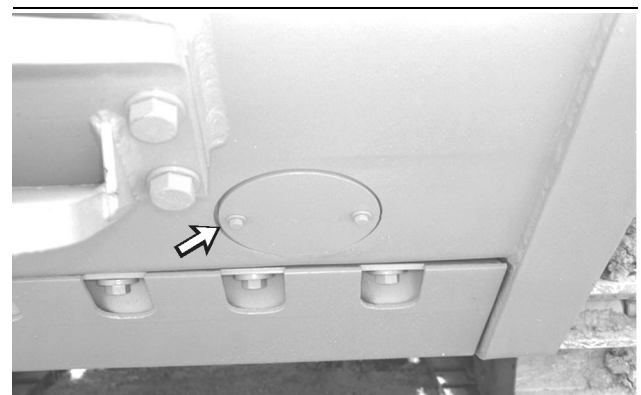


Illustration 214

g00532386

2. The access plate for the drain hose is located at the rear of the machine under the bottom radiator guard. Remove the bolts and the access plate.



Illustration 215

g00512572

3. Pull the drain hose for the radiator from the opening.
4. The drain valve is under the radiator. Open the drain valve. Allow the coolant to drain into a suitable container.
5. Close the drain valve. Fill the system with a solution which consists of clean water and of cooling system cleaner. The concentration of the cooling system cleaner should be 6 to 10 percent.
6. Start the engine. Run the engine for 90 minutes. Stop the engine. Drain the cleaning solution into a suitable container.
7. While the engine is stopped, flush the system with water. Flush the system until the draining water is clear.
8. Close the drain valve. Replace the drain hose and the access plate.
9. Add the coolant solution. See the following topics:
  - Operation and Maintenance Manual, "Cooling System Specifications"
  - Operation and Maintenance Manual, "Lubricant Viscosities"
  - Operation and Maintenance Manual, "Refill Capacities"

**Note:** If you are using Caterpillar antifreeze, do not add the supplemental coolant additive at this time. Also, do not change the supplemental coolant additive element at this time.

10. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes.

11. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.

12. If the gasket is damaged, replace the radiator cap. Install the radiator cap. Close the engine compartment access cover.

13. Stop the engine.

i00060003

## Cooling System Extended Life Coolant - Change

**SMCS Code:** 1350-044; 1395-044

For information about adding an extender to your cooling system, see Operation and Maintenance Manual, "Cooling System Extended Life Coolant Extender - Add" or consult your Caterpillar dealer.

## Flushing the ELC from the Cooling System

Some engines utilize Extended Life Coolant (ELC). See the Operation and Maintenance Manual, "Maintenance Interval Schedule" for the proper service interval. If an ELC was previously used, flush the cooling system with clean water. No other cleaning agents are required.

## Flushing a Standard Coolant from the Cooling System

If you change to an ELC from another type of coolant, use a Caterpillar cleaning agent to flush the cooling system. After you drain the cooling system, thoroughly flush the cooling system with clean water. **All of the cleaning agent must be removed from the cooling system.**

**Note:** See the Operation and Maintenance Manual, "Cooling System Coolant - Change" for the draining procedure and for the flushing procedure.

i00743002

## Cooling System Extended Life Coolant Extender - Add

**SMCS Code:** 1350; 1352-544-NL; 1395-544-NL

When a Caterpillar Extended Life Coolant (ELC) is used, an extender must be added to the cooling system. See the Operation and Maintenance Manual, "Maintenance Interval Schedule" for the proper service interval. The amount of extender is determined by the cooling system capacity.

Table 11

| RECOMMENDED AMOUNT OF EXTENDER BY COOLING SYSTEM CAPACITY |                                |
|---|--------------------------------|
| Cooling System Capacity                                   | Recommended Amount of Extender |
| 22 to 30 L (6 to 8 US gal)                                | 0.57 L (.60 qt)                |
| 30 to 38 L (8 to 10 US gal)                               | 0.71 L (.75 qt)                |
| 38 to 49 L (10 to 13 US gal)                              | 0.95 L (1 qt)                  |
| 49 to 64 L (13 to 17 US gal)                              | 1.18 L (1.25 qt)               |

Refer to Operation and Maintenance Manual, "Refill Capacities" for the cooling system capacity.

For additional information about adding an extender, see Operation and Maintenance Manual, "Coolant Recommendations" or consult your Caterpillar dealer.

i01028430

## Cooling System Level - Check

**SMCS Code:** 1353-535-FLV; 1395-535-FLV



Illustration 216

g00529527

The cooling system pressure cap is in the hood at the right rear of the machine.



Illustration 217

g00528755

1. Remove the cooling system pressure cap slowly in order to relieve the pressure.
2. Maintain the coolant level at 13 mm (0.5 inch) from the bottom of the filler pipe. If it is necessary to add coolant daily, check the system for leaks.
3. Install the cooling system pressure cap.
4. Inspect the radiator core for debris. Clean the radiator core, if necessary.

Use compressed air (30 psi maximum), high pressure water, or steam in order to remove dust and debris from the radiator core. However, the use of compressed air is preferred.

i01034885

## Cooling System Water Temperature Regulator - Clean/Replace

**SMCS Code:** 1355-070; 1355-510; 1393

Replace the thermostat on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system.

The thermostat should be replaced after the cooling system has been cleaned. Replace the thermostat while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

### NOTICE

Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

**Note:** If you are only replacing the thermostat, drain the cooling system coolant to a level that is below the thermostat housing.

1. Loosen the hose clamp and remove the hose from the elbow. Disconnect the hose assembly from the thermostat housing assembly.
2. Remove the bolts from the elbow. Remove the elbow and the thermostat housing assembly.
3. Remove the gasket, the thermostat, and the seal from the thermostat housing.

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**NOTICE**

Former thermostats may be used, if they meet test specifications and are not damaged or have excessive buildup or deposits.

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**NOTICE**

Since Caterpillar engines incorporate a shunt design cooling system, it is mandatory to always operate the engine with a thermostat.

Depending on load, failure to operate with a thermostat could result in either an overheating or an over-cooling condition.

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**NOTICE**

If the thermostat is installed incorrectly, it will cause the engine to overheat.

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4. Install a new seal in the thermostat housing. Install a new thermostat and a new gasket. Install the thermostat housing on the engine cylinder head.
5. Install the elbow and the hose. Tighten the hose clamp.

i01024741

## Engine Air Filter Primary Element - Clean/Replace

**SMCS Code:** 1051-070-PY; 1051-510-PY;  
1054-070-PY; 1054-510-PY



Illustration 218

g00518349

1. Open the front access door on the right side of the machine.

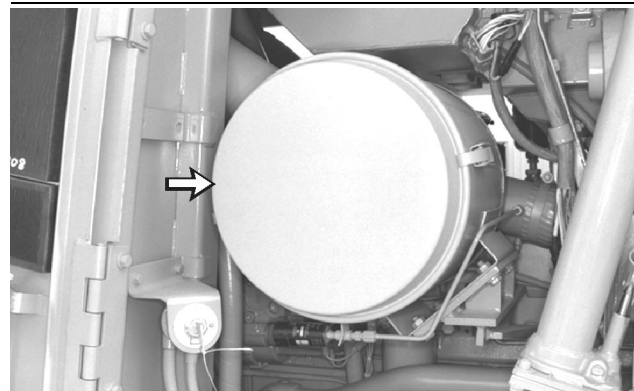


Illustration 219

g00526756

2. Remove the air cleaner cover.

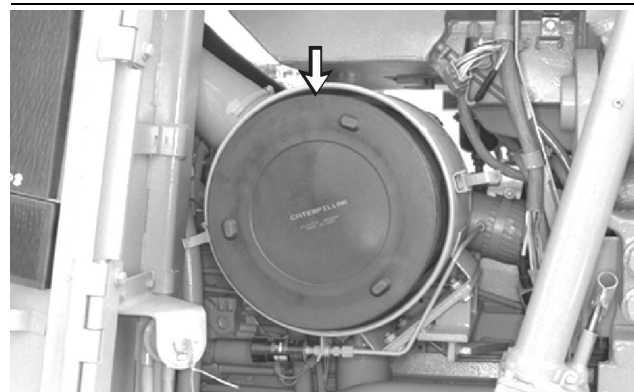


Illustration 220

g00526765

3. Remove the primary filter element from the air cleaner housing.

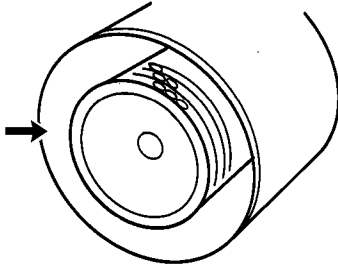


Illustration 221

g00287513

4. Clean the inside of the air cleaner housing.
5. Inspect the primary element. If the pleats, the gaskets, or the seals are damaged, discard the element. Replace a damaged primary element with a clean primary element.

#### NOTICE

Do not clean the filter elements by bumping or tapping them. Do not use filter elements with damaged pleats, gaskets or seals. Engine damage can result.

Make sure the cleaned filter elements are completely dry before installing into the filter housing. Water remaining in the elements can cause false indications of contamination in Scheduled Oil Sampling test results.

6. If the primary element is not damaged, clean the primary element.

The filter elements can be cleaned by using the following methods:

- Pressure air
- Pressure water
- Detergent washing

When you use pressure air, the maximum air pressure is 205 kPa (30 psi). When you use pressure water, the maximum water pressure is 280 kPa (40 psi).

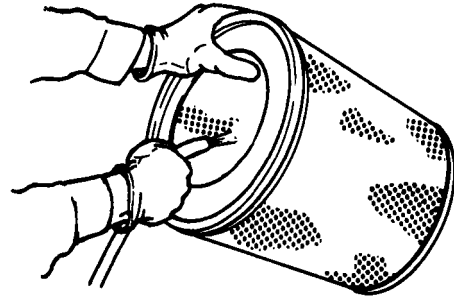


Illustration 222

g00287514

7. When you clean the inside pleats and the outside pleats, direct the air along the pleats or direct the water along the pleats.

The element can be washed in a solution that consists of warm water and of nonsudsing household detergent. Fully rinse the pleats. Allow the filter to air dry completely.

8. Inspect the filter elements after you clean the filter elements. Do not use a filter if the pleats, the gaskets or the seals are damaged.
9. Install a clean primary filter element.

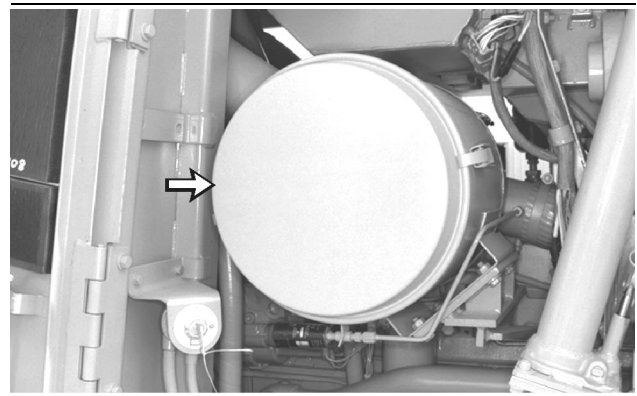


Illustration 223

g00526756

10. Clean the cover and install the cover.
11. Reset the filter element indicator.
12. Start the engine. If the yellow piston in the filter element indicator moves into the red zone, install a new primary filter element. Also if the exhaust smoke is black, install a new primary filter element.
13. Close the access door.

**Note:** A primary element may be cleaned for a maximum of six times. Replace the primary element if the primary element has been used for one year.

i01024939

## Engine Air Filter Secondary Element - Replace

**SMCS Code:** 1051-510-SE; 1054-510-SE

### NOTICE

Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

**Note:** Replace the secondary filter element when you service the primary element for the third time. If a clean primary element has been installed and the filter element indicator still enters the red zone, replace the secondary filter element. Also if the exhaust smoke remains black and a clean primary filter element has been installed, replace the secondary filter element.



Illustration 224

g00518349

1. Open the front access cover on the right side of the machine.
2. Remove the housing cover and the primary element.

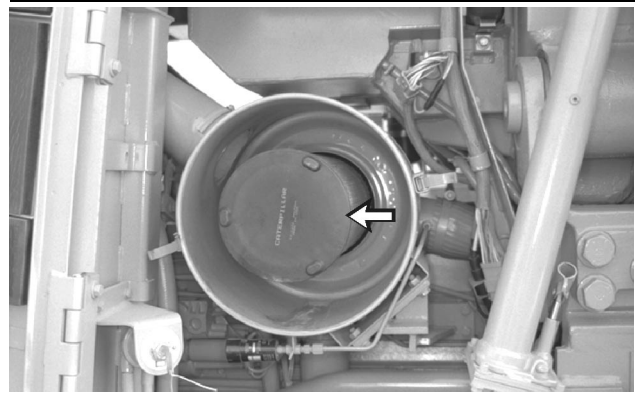


Illustration 225

g00526888

3. Remove the secondary element.
4. Cover the air inlet opening. Clean the inside of the air cleaner housing.
5. Inspect the gasket between the air inlet and the housing. If the gasket is damaged, replace the gasket.
6. Uncover the air inlet opening. Install a new secondary element.
7. Install the primary element and the air cleaner housing cover.
8. Close the access cover.

i01024629

## Engine Air Precleaner - Clean

**SMCS Code:** 1050-070

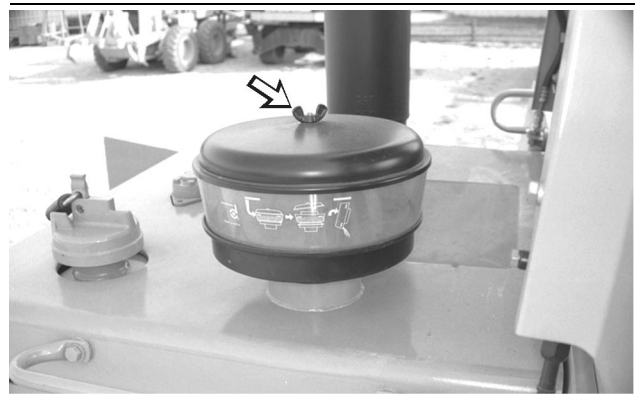


Illustration 226

g00526704

1. Inspect the air inlet screen for dirt and for trash.
2. Remove the screen. Clean the screen if the screen is dirty.
3. Inspect the pre-cleaner tube for dirt and for dust.



4. Clean the precleaner tube with pressure air if the precleaner tube is dirty.

#### NOTICE

Service the air cleaner only with the engine stopped. Engine damage could result.

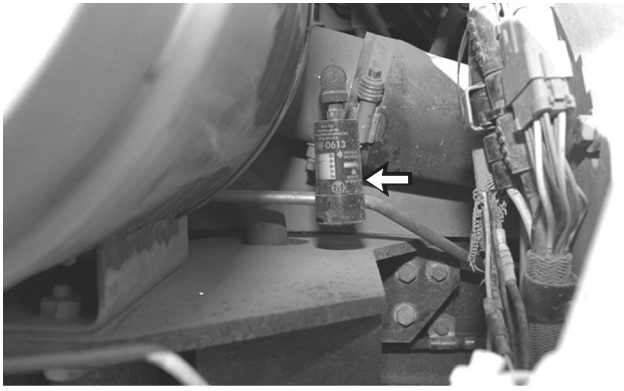


Illustration 227

g00526726

Run the engine at high idle. If the yellow piston in the filter element indicator enters the red zone, service the air cleaner. Stop the engine.

i01031529

## Engine Crankcase Breather - Clean

**SMCS Code:** 1317-070



Illustration 228

g00530992

1. The access door is located on the right side of the machine. Open the access door.

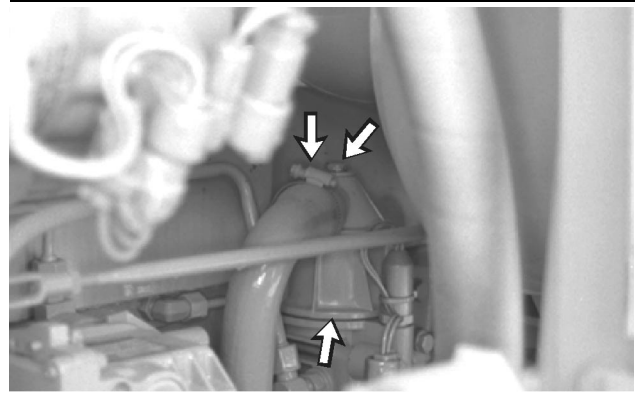


Illustration 229

g00530999

2. Loosen the breather outlet hose clamps. Remove the hose from the breather cover.
3. Loosen the breather inlet hose clamp. Remove the engine crankcase breather.
4. Check the condition of the cover seal. Replace the cover seal if the cover seal is damaged.
5. Wash the breather element and the breather element cover assembly in a clean nonflammable solvent.
6. Shake the breather element until the breather element is dry. You may also use pressure air to dry the breather element.
7. Check the condition of the hose. Replace the hose if the hose is damaged.
8. Install the breather element cover assembly.
9. Install the hose and the breather outlet hose clamps.
10. Close the access door.

i01028265

## Engine Oil Level - Check

**SMCS Code:** 1302-535-FLV; 1326-535-FLV

### **WARNING**

**Hot oil and components can cause personal injury.**

**Do not allow hot oil or components to contact skin.**

#### NOTICE

Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.



Illustration 230

g00529383

1. Open the rear access door that is on the right side of the machine behind the operator's compartment.

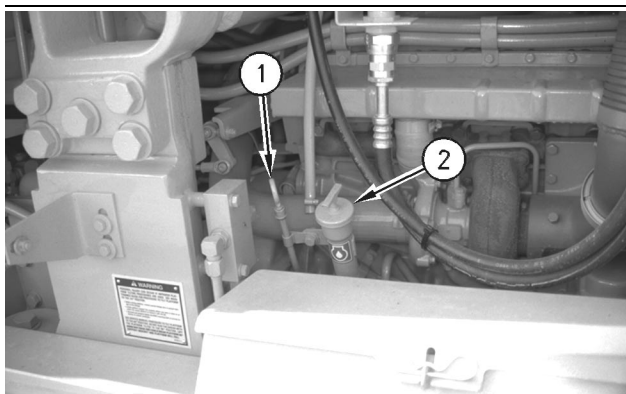


Illustration 231

g00529386

2. Check dipstick (1) while the engine is running. Maintain the oil level between the marks on the "engine running" side of the dipstick. Check dipstick (1) while the engine is stopped. Maintain the oil level between the marks on the "engine stopped" side of the dipstick.

**Note:** When you operate the machine on severe slopes, the oil level in the engine crankcase must be at the FULL mark on the "engine stopped" side of the dipstick.

3. Remove oil filler cap (2). If necessary, add oil.
4. Clean the oil filler cap and install the oil filler cap.
5. Close the access door.

## Engine Oil and Filter - Change

**SMCS Code:** 1308-510; 1318-510

### **WARNING**

**Hot oil and components can cause personal injury.**

**Do not allow hot oil or components to contact skin.**

### **NOTICE**

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide", for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.



Illustration 232

g00529974

1. Remove the crankcase drain access cover, which is in the crankcase guard.
2. Remove the section of hose from the tool box. Remove the crankcase drain plug. Install the hose. Open the valve. Allow the oil to drain into a suitable container.

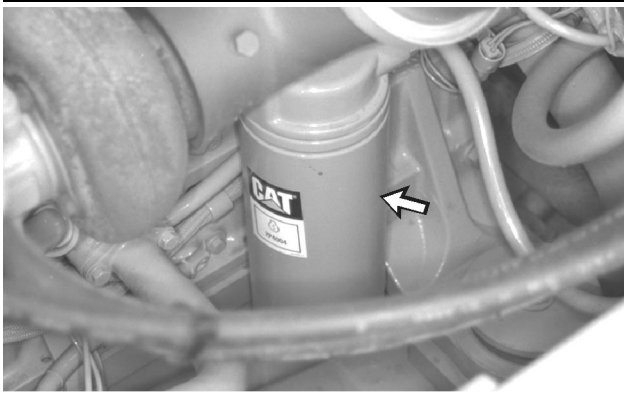


Illustration 233

g00529975

3. Open the right engine access cover. Remove the crankcase oil filter element and discard the crankcase oil filter element properly. Make sure that all of the old filter seal is removed from the filter base.
4. Apply a thin coat of oil to the new filter seals. Install the new crankcase oil filter elements by hand. When the gaskets contact the filter base, tighten the filter elements by an additional turn of 270 degrees. Rotation index marks are on the new filter elements. These rotation index marks are spaced at 90 degree intervals. Use these rotation index marks as a guide for proper tightening.
5. Remove the hose. Close the valve. Return the hose to the tool box. Install the crankcase drain plug. Install the crankcase drain access cover.

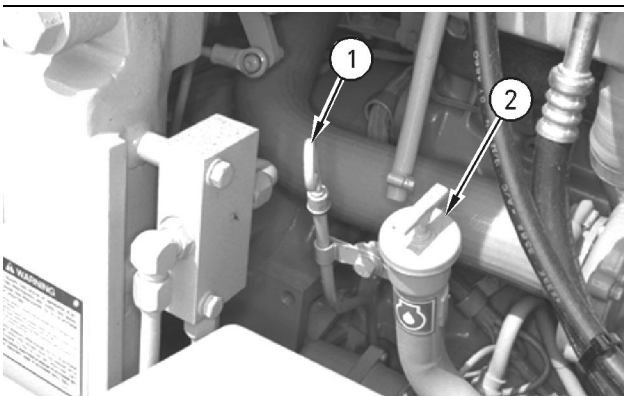


Illustration 234

g00530017

6. Remove the oil filler cap (2). Fill the crankcase with new oil. See Operation and Maintenance Manual, "Refill Capacities". Clean the oil filler cap and install the oil filler cap.
7. Always measure the oil level with dipstick (1) in order to ensure that the correct amount of oil was added.

8. On the dipstick, maintain the oil level between the "ADD" mark and "FULL" mark.
9. Close the access cover.

i01300278

## Engine Valve Lash - Check

**SMCS Code:** 1102-535; 1105-535

Refer to Systems Operation, Testing and Adjusting, SENR3583, "3114, 3116 and 3126 Engines" for the correct procedures when you check engine valve lash and/or fuel injector timing.

**Note:** Make sure that qualified service personnel check the injector fuel timing. If an adjustment is necessary, make sure that qualified service personnel adjust the injector fuel timing. Special tools and training are required.

**Note:** The correct fuel timing specification is shown on the Engine Information Plate. Fuel timing specifications will be different with each engine application and with each power rating.

Consult your Caterpillar dealer for the complete adjustment procedure.

i01035233

## Equalizer Bar End Pins - Lubricate

**SMCS Code:** 7206-086-PN; 7207-086-PN

### NOTICE

Apply lubricant to the fittings with a hand operated grease gun only. Use of pressure operated lubricating equipment damages the seals.



Illustration 235

g00513609

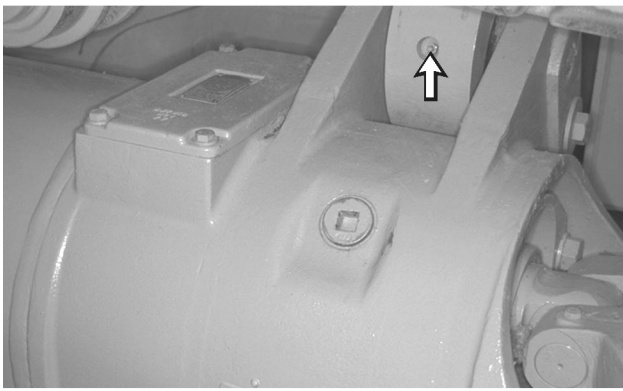


Illustration 236

g00513612

Lubricate the equalizer bar pins through the fittings. There is one fitting on each side of the machine.

i01030643

## Equalizer Bar Pins - Inspect

**SMCS Code:** 7206-040-PN; 7207-040-PN

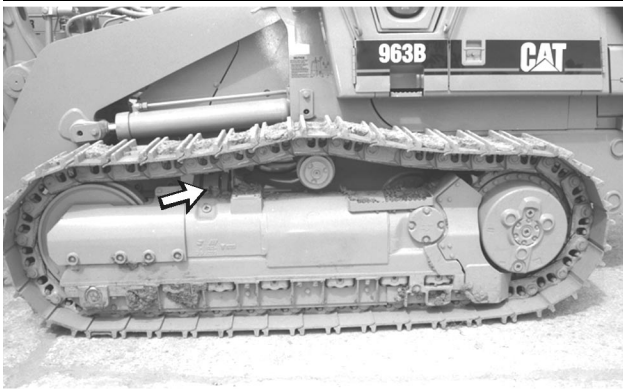


Illustration 237

g00530655

Check the equalizer bar pins for looseness and for unusual wear.

If unusual wear is evident, see the Service Manual or consult your Caterpillar dealer for an inspection and for repair instructions.

i01041855

## Equalizer Bar Pins - Lubricate

**SMCS Code:** 7206-086-PN; 7207-086-PN

### NOTICE

Apply lubricant to the fittings with a hand operated grease gun only. Use of pressure operated lubricating equipment damages the seals.

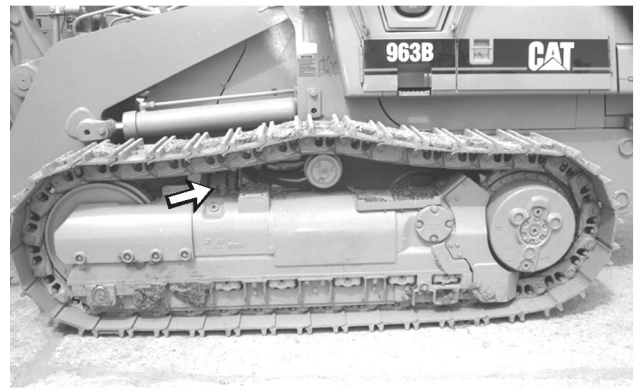


Illustration 238

g00530655

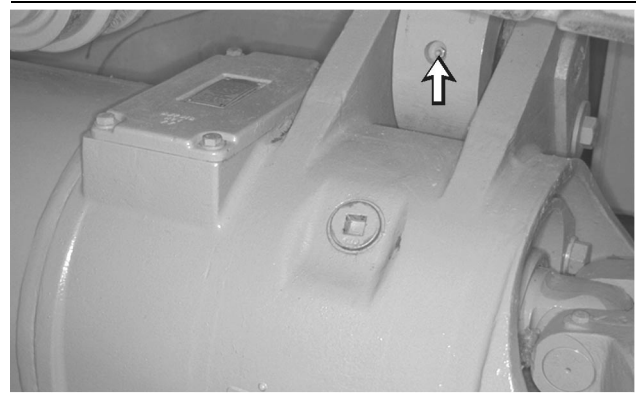


Illustration 239

g00691029

Lubricate the equalizer bar pins through the fittings. There is one fitting on each side of the machine.

i01025219

## Ether Starting Aid Cylinder - Replace

**SMCS Code:** 1456-510-CD



Illustration 240

g00518349

1. Open the engine access door.

i01033513

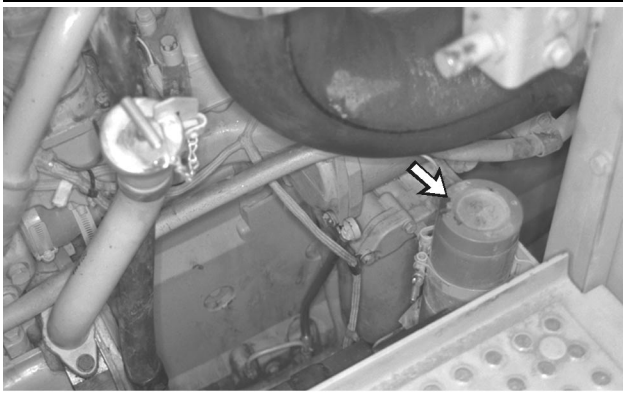


Illustration 241

g00691041

2. The ether starting aid cylinder is mounted on the left, side wall of the engine compartment.
3. Loosen the cylinder retaining clamp. Unscrew the empty ether starting aid cylinder and remove the empty ether starting aid cylinder.
4. Remove the used gasket. Install the new gasket that is provided with each new ether starting aid cylinder.
5. Install the new ether starting aid cylinder. Tighten the ether starting aid cylinder by hand. Tighten the cylinder retaining clamp securely.
6. Close the engine access door.

i01028602

## Final Drive - Inspect

**SMCS Code:** 4050-040

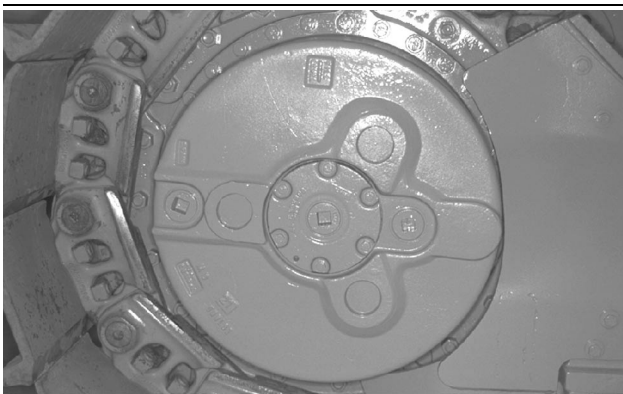


Illustration 242

g00513619

Inspect the final drives for leaks. Check for damage to the sprocket.

## Final Drive Oil - Change

**SMCS Code:** 4050-044-FLV

### NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide", for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Wipe the covers and the surfaces around openings before checking or adding oil.

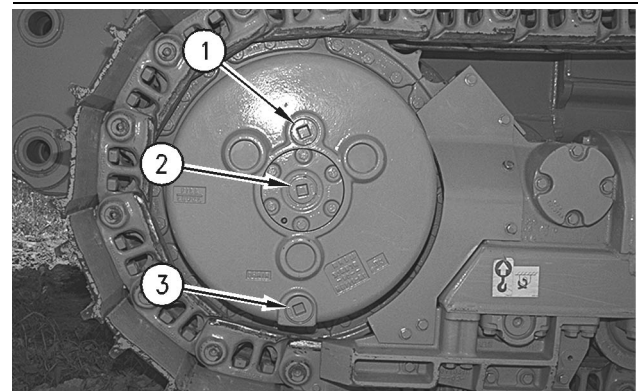


Illustration 243

g00287508

**Note:** Perform the following procedure to the final drive on each side of the machine.

1. Move the machine so that drain plug (3) is located on the bottom of the final drive.
2. Remove filler plug (1). Remove drain plug (3) in the outer compartment. Drain the oil into a suitable container.

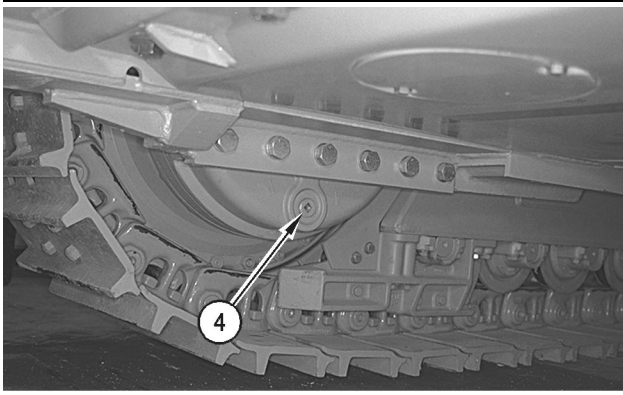


Illustration 244

g00287509

3. Remove drain plug (4) from the inner compartment. Allow the oil to drain into a suitable container.
4. Clean the drain plugs and install the drain plugs.
5. Slowly fill the final drive with oil. The oil level is at the bottom of opening (2). Refer to Operation and Maintenance Manual, "Refill Capacities" for the refill capacities for the final drives.
6. Clean the filler plug and the oil level plug. Install the plugs.
7. Repeat this procedure for the opposite side of the machine.

i00640732

## Final Drive Oil Level - Check

**SMCS Code:** 4050-535-FLV

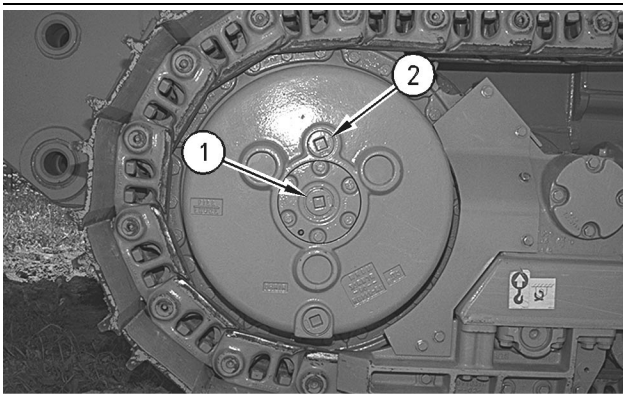


Illustration 245

g00287510

1. Remove center oil level plug (1).
2. Maintain the oil level to the bottom of the opening for plug (1).

3. If oil is required, remove oil filler plug (2) and add oil.
4. Clean the plugs and reinstall the plugs.
5. Check for leakage or excessive sprocket wear.
6. Repeat the procedure on the other side of the machine.

i01025910

## Fuel System - Prime

**SMCS Code:** 1258

If the engine does not start, air is trapped in the fuel lines to the engine. Use the following procedure in order to purge air from the fuel lines.

## Fuel Priming Pump



Illustration 246

g00527648

1. Unlock the priming pump plunger. Operate the plunger until you feel resistance.
2. Push in the plunger. Hand tighten the plunger.
3. Start the engine. If the engine does not start, or if the engine continues to misfire or smoke, continue to prime the fuel system.
4. Run the engine at the LOW IDLE position until the engine runs smoothly.

i01025530

## Fuel System Primary Filter (Water Separator) Element - Replace

**SMCS Code:** 1260-070; 1260-510; 1261

### **WARNING**

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

### **WARNING**

Personal injury or death can result from engine overspeed.

If the engine overspeeds, it can cause injury or parts damage.

Be prepared to stop the engine by closing the air off to the air inlets or by manually pushing downward on the governor shutdown rod.

### **WARNING**

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch **OFF** or disconnect the battery when changing fuel filters.

### NOTICE

Do not fill fuel filter with fuel before installing the fuel filter. Contaminated fuel causes accelerated wear to fuel system parts.

1. Open the access door for the engine compartment. The access door is located on the right side of the machine.

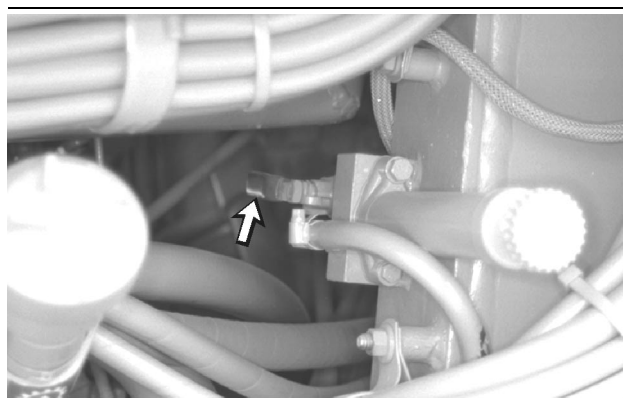


Illustration 247

g00527473

2. Turn the fuel shutoff valve in order to shut off the fuel supply.

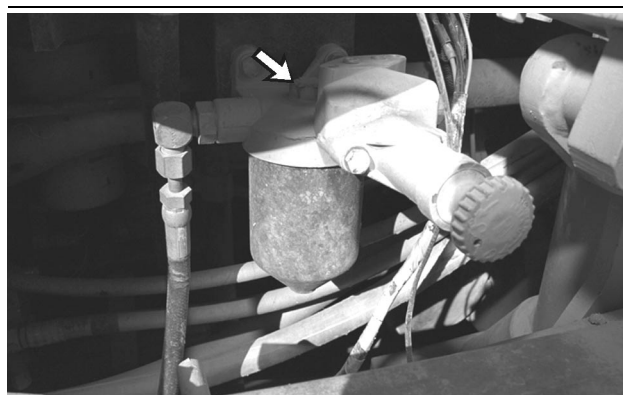


Illustration 248

g00527475

3. Open both access doors for the engine compartment on the left side of the machine. Loosen the retaining nut on the filter housing.

4. Remove the case and the filter element. Remove the filter element from the case.

5. Wash the filter element and wash the case in a clean, nonflammable solvent. Dry the filter element by using pressure air. When you use pressure air, the maximum air pressure is 205 kPa (30.0 psi).

6. Clean the filter housing base. Inspect the filter seal. Replace the seal if the seal is damaged or worn.

7. Install the clean element into the case. Install the case and the element into the housing base.

8. Install the retaining nut and tighten the nut to a torque of 24 N·m (18.0 lb ft).

9. Prime the fuel system. Refer to Operation and Maintenance Manual, "Fuel System - Prime" for additional information. Close the access door.



i01025723

## Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

### WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

### WARNING

Personal injury can result when using cleaner solvents.

To help prevent personal injury, follow the instructions and warnings on the cleaner solvent container before using.

### WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

### NOTICE

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

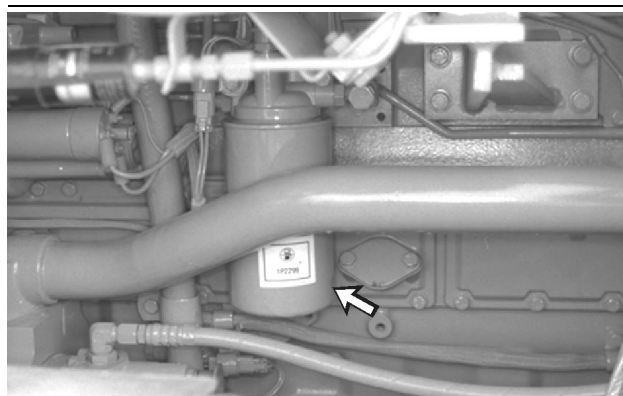


Illustration 249

g00527561

**Note:** Replace the secondary filter at every 250 service hour interval.

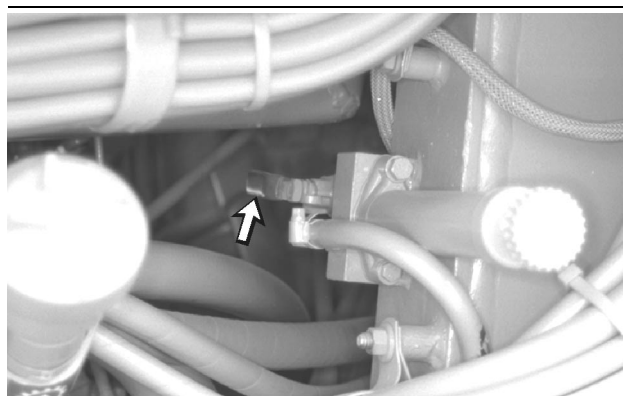


Illustration 250

g00527473

1. Shut off the fuel tank supply valve.
2. Remove the secondary filter.
3. Clean the filter mounting base. Make sure that the old seal is removed.
4. Coat the seal of the new filter with clean diesel fuel.
5. Install a new secondary filter. Hand tighten the filter. When the seal contacts the base, tighten the filter by an additional 3/4 turn.

Rotation index marks are positioned on the filter at 90 degree intervals. Use these rotation index marks as a guide when you tighten the filter.

**Note:** Install a new, dry filter. Never fill a new filter with fuel before you install the filter. Dirty fuel can damage the fuel injectors. This damage will cause premature problems in the fuel system.

6. Open the fuel tank supply valve.



7. Prime the fuel system. Refer to Operation and Maintenance Manual, "Fuel System - Prime" for additional information.
8. Start the engine. Check for leaks.

i01035072

## Fuel Tank Cap and Strainer - Clean

**SMCS Code:** 1273-070-STR; 1273-070-Z2



Illustration 251

g00689270

1. Remove the fuel tank cap and the strainer.
2. Disassemble the fuel cap. Wash the cap and the strainer. Wash these components in a clean, nonflammable solvent.
3. Inspect the seal of the fuel cap. Replace the seal if the seal is damaged.
4. Put a light coat of oil on the cap components.
5. Install the strainer.
6. Assemble the fuel cap and install the fuel cap.

## Fuel Tank Water and Sediment - Drain

i01028499

**SMCS Code:** 1273-543-M&S

### NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide", for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

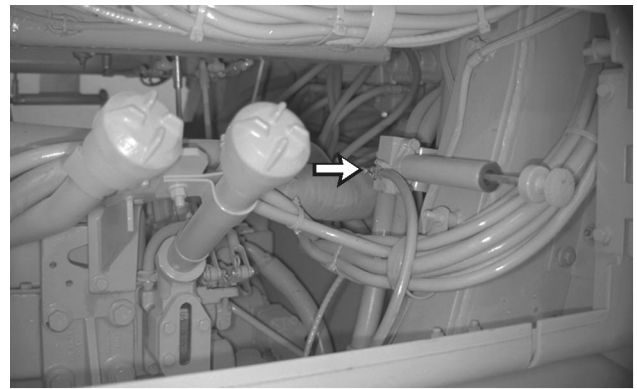


Illustration 252

g00514377

The drain valve is located on the right side of the machine.

1. Open the access door.

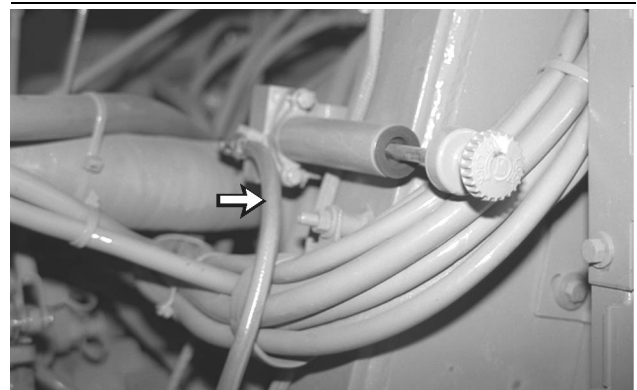


Illustration 253

g00514372

2. Remove the drain line from the opening.

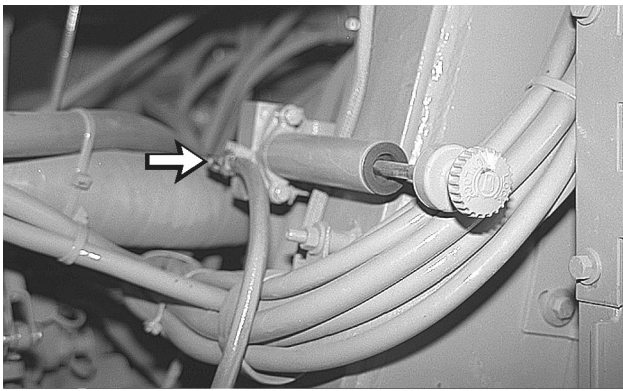


Illustration 254

g00513901

3. Open the drain valve.
4. Allow the water and the sediment to drain into a suitable container.
5. Close the drain valve. Place the drain line back into the opening.
6. Close the access door.

i01026832

## Fuses - Replace

**SMCS Code:** 1417-510



Illustration 255

g00518349

The fuses are located inside the access door of the engine compartment. The access door is located on the right side of the machine.



**Fuses** – Fuses protect the electrical system from damage that is caused by overloaded electrical circuits. Replace a fuse if the element separates. If the fuse of a particular electrical system requires frequent replacement, check the electrical circuit. Repair the electrical circuit, if necessary.

### NOTICE

Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

### NOTICE

If it is necessary to replace fuses frequently, an electrical problem may exist.

Contact your Caterpillar dealer.

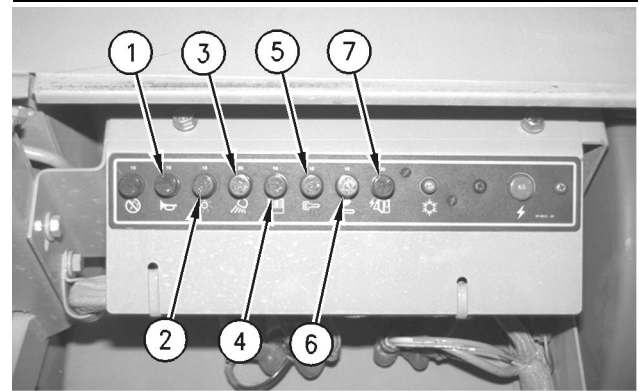


Illustration 256

g00691293



Horn (1) – 10 Amp



Backup Alarm (2) – 10 Amp



Flood Lights (3) – 20 Amp



Electronic Monitoring System (4) – 10 Amp



Key Start Switch (5) – 10 Amp



Cigar Lighter (6) – 10 Amp



Cab Power fuse (7) – 10 Amp

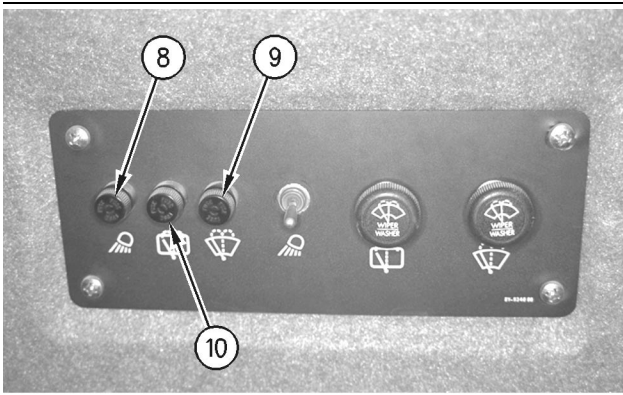


Illustration 257

g00691294



Front Flood Lights (8) – 10 Amp



Front Windshield Wipers (9) – 10 Amp



Rear Windshield Wipers (10) – 10 Amp

i01032276

## Hydraulic System Oil - Change

SMCS Code: 5050-044

### WARNING

**Use caution when changing oil or changing filters. Hot oil or components can cause burns if they contact skin.**

Operate the machine in order to warm the oil.

Park the machine on level ground. Lower all attachments to the ground with a slight downward pressure. Move the transmission lock lever downward into the LOCKED position. Stop the engine.

**Note:** Use 6V-3155 Brace Assembly in order to support the bucket whenever the lift cylinders are in the RAISE position.

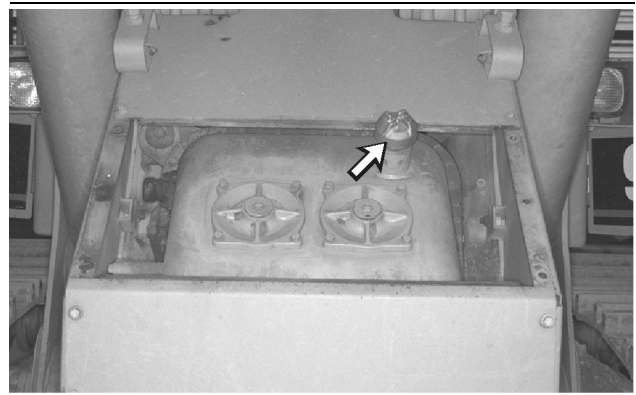


Illustration 258

g00514381

1. Remove the top cover in order to gain access to the hydraulic oil filters that are located in the hydraulic tank. Remove the hydraulic tank filler cap slowly in order to relieve any pressure. Check the cap seal. If the cap seal is cut or damaged, replace the cap seal.

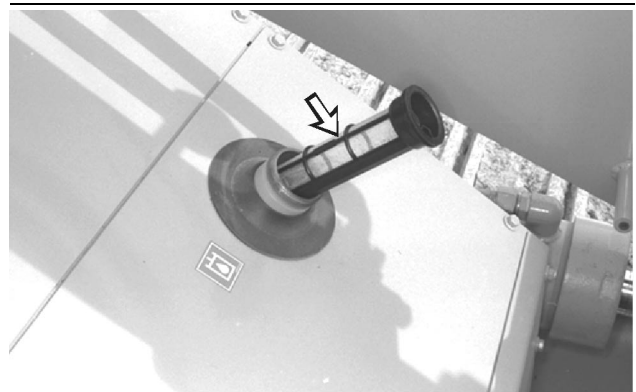


Illustration 259

g00528224

2. Remove the filler strainer. Wash the filler strainer in a clean nonflammable solvent.

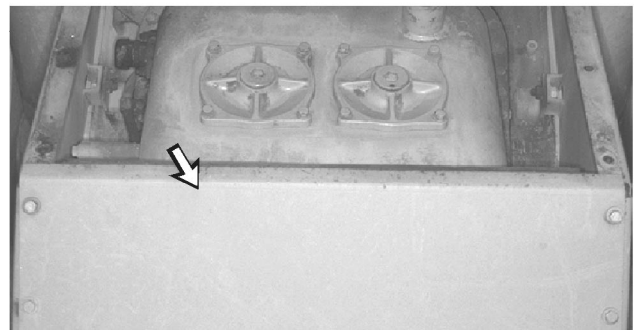


Illustration 260

g00520708

3. Remove the front access cover. Remove the bottom access cover.

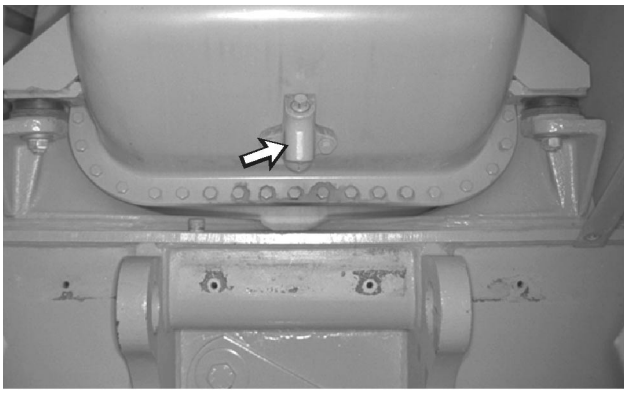


Illustration 261

g00520709

4. Remove the oil drain hose. If the machine is equipped with an oil drain plug, remove the plug. Open the drain valve. Drain all the oil into a suitable container. Close the drain valve.
5. If the machine is equipped with a drain plug, install the drain plug. Replace the drain hose. Install the bottom access cover and the front access cover.
6. Change the hydraulic system filters. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Replace".
7. Install the filler strainer.
8. Fill the hydraulic oil tank. Refer to Operation and Maintenance Manual, "Refill Capacities" in order to determine the amount of hydraulic oil that is needed to fill the hydraulic oil tank.
9. Install the filler cap.
10. Start the engine. Run the engine for a few minutes.

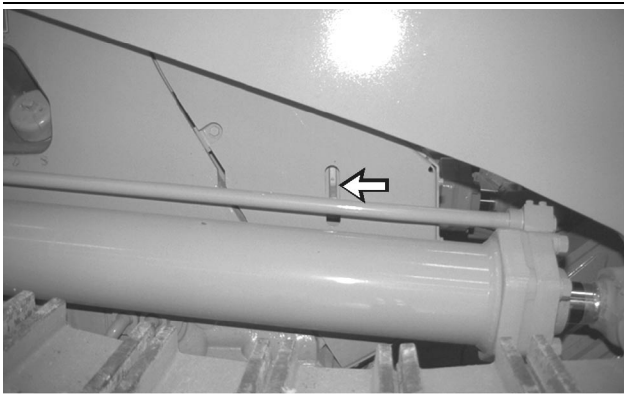


Illustration 262

g00514508

11. Maintain the oil level to the "FULL" mark in the sight gauge. Add oil, if necessary.

12. Stop the engine.

**Note:** The above procedure is for draining the tank. Consult your Caterpillar dealer or refer to the Service Manual for instructions on completely draining the hydraulic system.

i01032044

## Hydraulic System Oil Filter - Replace

**SMCS Code:** 5068-510

### **WARNING**

**Use caution when changing oil or changing filters. Hot oil or components can cause burns if they contact skin.**

**Note:** Use a 6V-3155 Brace Assembly in order to support the bucket whenever the lift cylinders are in the RAISE position.

1. Remove the tank cover.
2. Slowly remove the hydraulic tank filler cap in order to relieve the system pressure.

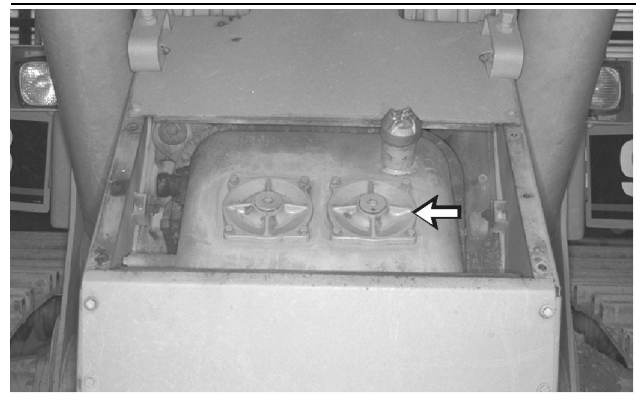


Illustration 263

g00518266

3. Remove the bolts from the filter cover. Use the handle to pull up the filter assembly. Remove the filter assembly.

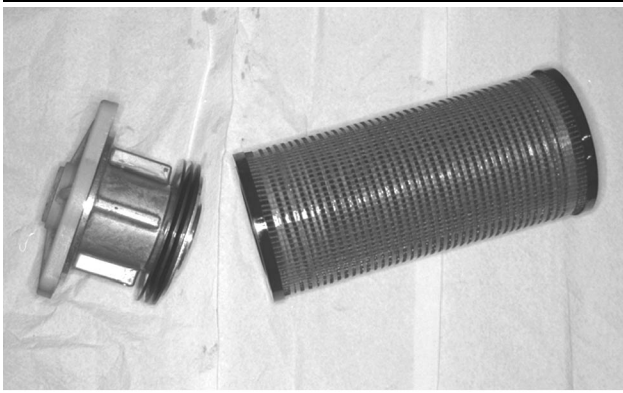


Illustration 264

g00518269

4. Remove the filter element. Properly discard the filter element.

Apply a thin coat of oil to the seal on the new filter.

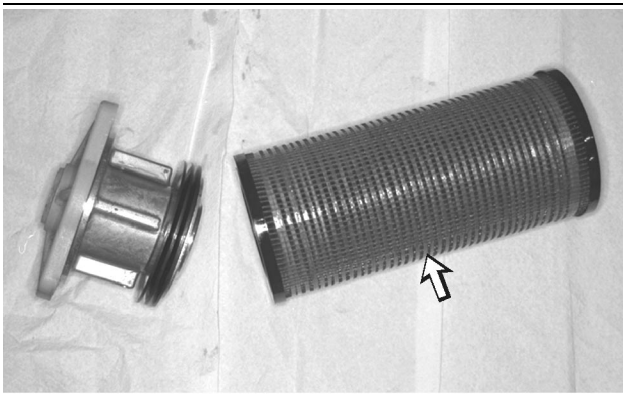


Illustration 265

g00518271

5. Inspect the new filter. Install the new filter element by hand. Install the retainer and the nut. Tighten the nut to a torque of  $10 \pm 1.5 \text{ N}\cdot\text{m}$  ( $7.4 \pm 1.1 \text{ lb}\cdot\text{ft}$ ).



Illustration 266

g00518274

6. Check the condition of the seal for the filter cover. If the seal is damaged or if the seal is cut, replace the seal. Lubricate the seal with clean hydraulic oil.

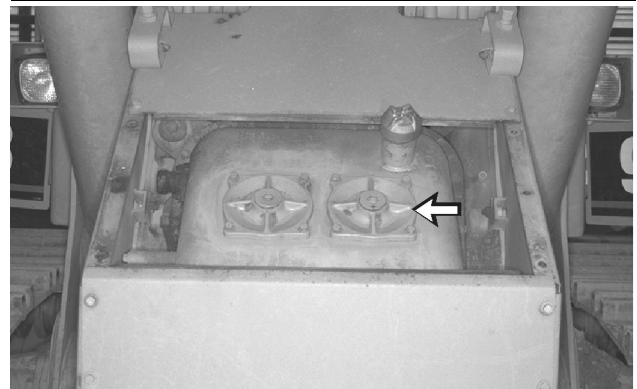


Illustration 267

g00518266

7. Install the filter assembly in the filter housing. Use caution to align the filter assembly properly. Install the cover and tighten the cover bolts.

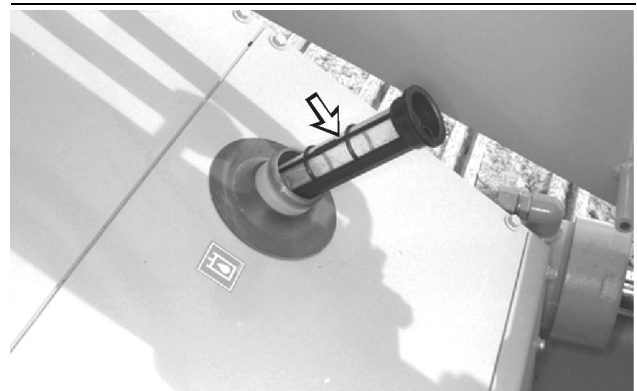


Illustration 268

g00528224

8. Remove the filler strainer and clean the filler strainer. Install the filler strainer and the filler cap.

i01032717

## Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV; 7479

### WARNING

Use caution when changing oil or changing filters. Hot oil or components can cause burns if they contact skin.

Note: Use a 6V-3155 Brace Assembly in order to support the bucket whenever the lift cylinders are in the RAISE position.



Illustration 269

g00529445

The sight gauge for the hydraulic tank is located on the right front side of the machine.

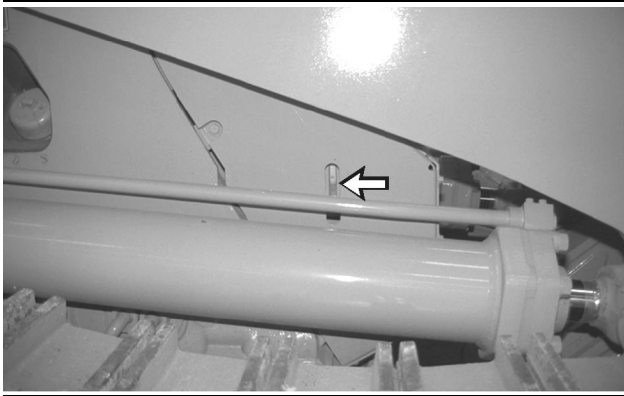


Illustration 270

g00514508

1. Maintain the oil level to the "FULL" mark in the sight gauge.

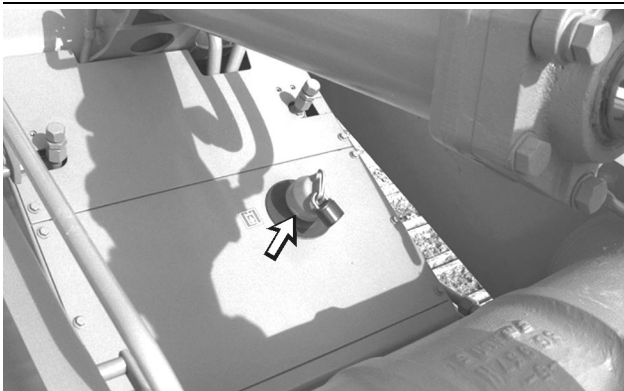


Illustration 271

g00529447

2. If the hydraulic system requires additional hydraulic oil, remove the filler cap and add oil through the filler tube.
3. Clean the filler cap and install the filler cap.

## Hydrostatic Transmission Oil Filter - Replace

SMCS Code: 3067

### WARNING

**Use caution when changing oil or changing filters. Hot oil or components can cause burns if they contact skin.**

The machine should be parked on a level surface. All attachments should be lowered to the ground. The transmission lock lever should be in the LOCKED position. The engine should be OFF.



Illustration 272

g00529974

1. Remove the crankcase drain access cover, which is in the crankcase guard.
2. Pull the drain line out of the opening.
3. Remove the drain plug from the end of the hose.



Illustration 273

g00529104

4. Open both access doors on the left side of the machine.



i01028321

## Hydrostatic Transmission Gear Box Oil - Change

SMCS Code: 3080-044

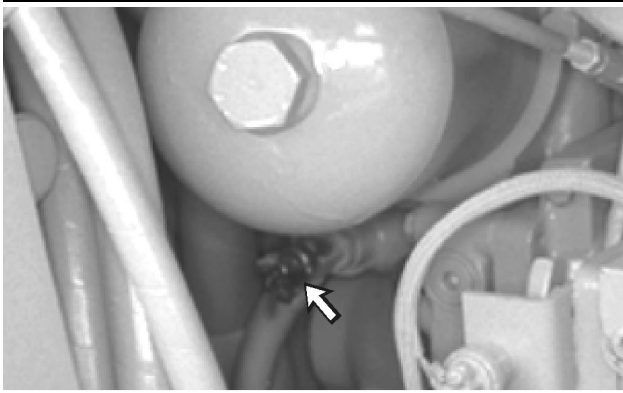


Illustration 274

g00531266

5. Open the drain valve that is located below the transmission oil filter. Drain the oil into a suitable container.
6. Close the drain valve. Replace the drain plug in the drain line.
7. Put the drain hose back into the opening. Install the access cover.

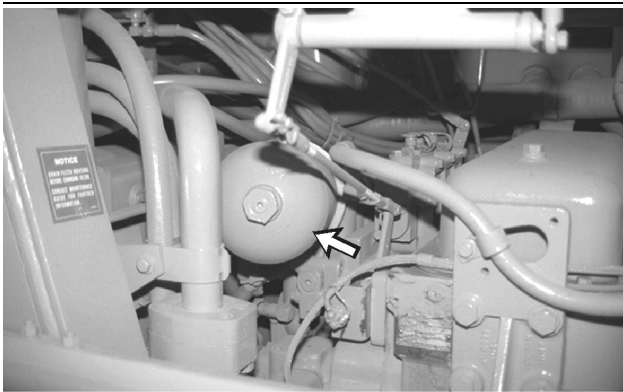


Illustration 275

g00691057

8. Remove the transmission oil filter.
9. Remove the used filter element and the housing from the filter base. Inspect the seal on the top of the housing. Replace the seal if the seal is cut or damaged.
10. Clean the filter housing with a clean, dry cloth.
11. Install a new filter element into the filter housing. Install the cover assembly into the housing.
12. Fill the transmission with oil. Refer to Operation and Maintenance Manual, "Refill Capacities" for the oil capacity of the transmission.
13. Close the access doors.



Illustration 276

g00528914

1. Open the engine access door on the left side of the machine.

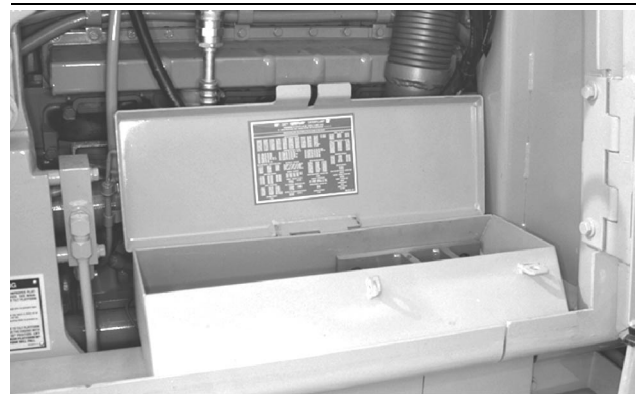


Illustration 277

g00532064

2. Open the tool box and remove the 25.4 mm (1.00 inch) pipe nipple.

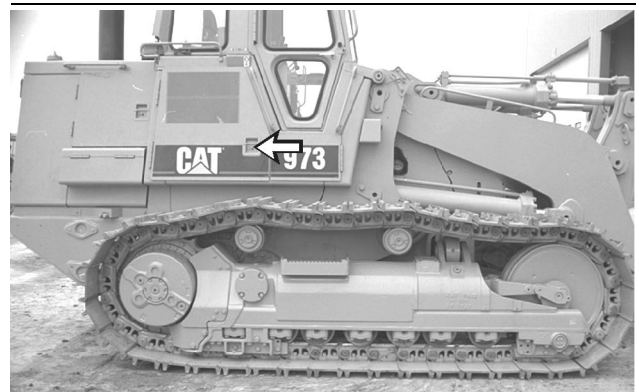


Illustration 278

g00512470

3. Open the engine access door on the right side of the machine.

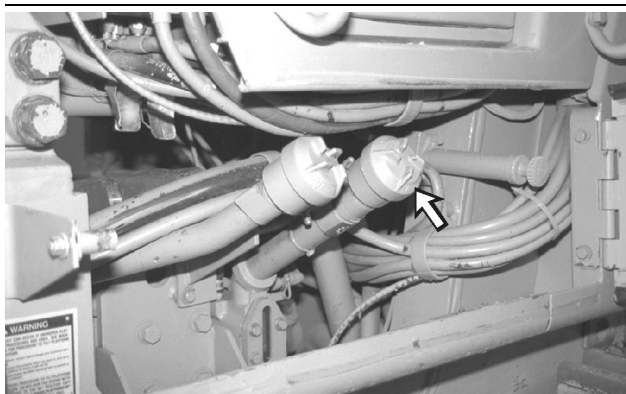


Illustration 279

g00514510

4. Remove the filler cap for the hydrostatic transmission.

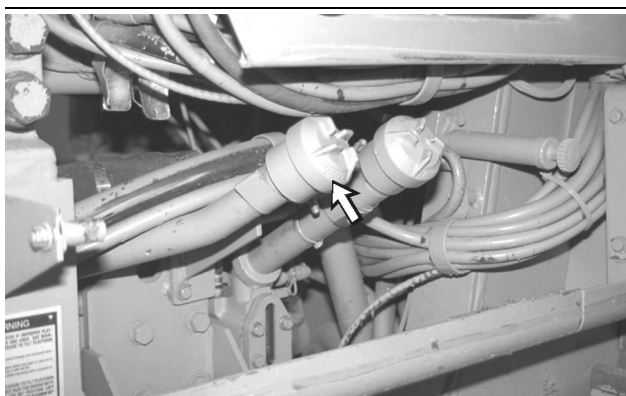


Illustration 280

g00517067

5. Remove the filler cap for the pump drive.
6. There are two access plates on the bottom of the machine. Remove the front access plate that is located closest to the front of the machine.
7. Remove the drain plug. Insert the threaded end of the tool into the drain opening in order to release the check valve. Drain the oil into a suitable container.
8. When the oil is completely drained from the hydrostatic transmission, remove the tool. Thoroughly clean the drain plug and install the drain plug. Install the front access plate.
9. Fill the hydrostatic transmission with oil. Refer to Operation and Maintenance Manual, "Refill Capacities" for additional information.

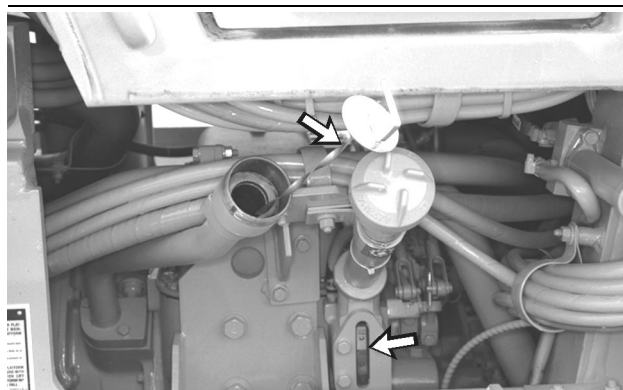


Illustration 281

g00532113

10. Check the oil level. The oil level should be between the ADD and FULL marks on the dipstick, while the engine is running.
11. Check the sight gauge. Maintain the oil level between the "ADD" mark and the "FULL" mark.
12. If it is necessary to add oil, add oil through the filler tube.
13. Install the filler cap.
14. Put the tool back into the tool box and close the access doors on both sides of the machine.

i01028334

## Hydrostatic Transmission Gear Box Oil Level - Check

**SMCS Code:** 3030-535-FLV; 3081-535-FLV



Illustration 282

g00518349

1. Open the front engine compartment access door on the right side of the machine.



i01028607

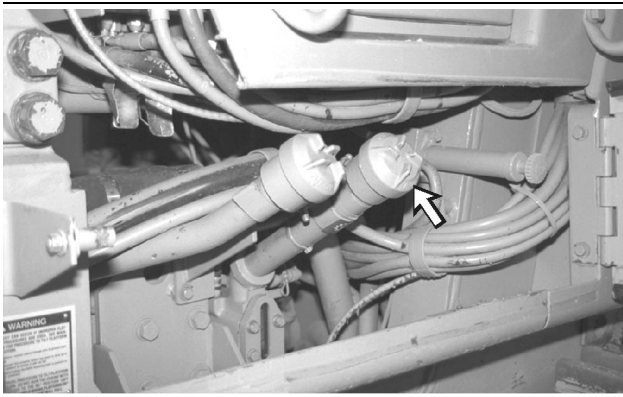


Illustration 283

g00691048

2. The hydrostatic transmission is a pressurized compartment. Slowly remove the oil fill cap in order to relieve any pressure.

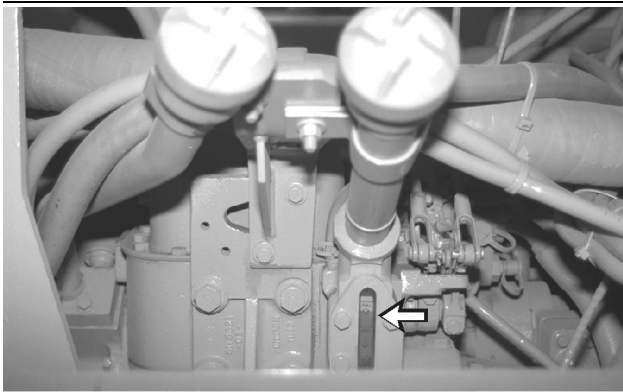


Illustration 284

g00691049

3. Check the sight gauge. Maintain the oil level between the "ADD" mark and the "FULL" mark.
4. If it is necessary to add oil, add oil through the filler tube.
5. Install the filler cap.
6. Close the access door.

## Idler Swing Link - Lubricate

SMCS Code: 4159-086

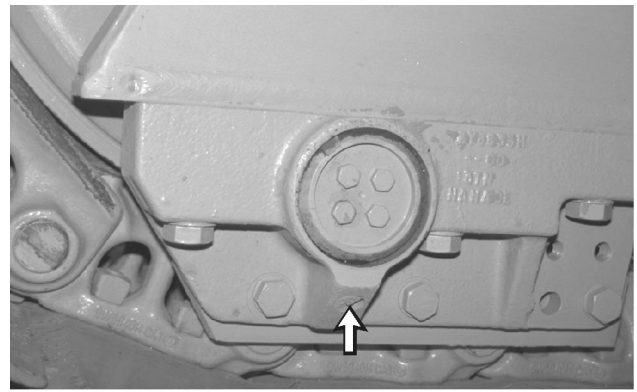


Illustration 285

g00514512

Apply lubricant through a total of four fittings. There are two fittings on each idler. There is one link on each side of the machine. Lubricate the fitting on each end of the shaft that is in each link.

i01028558

## Indicators and Gauges - Test

SMCS Code: 4100-081; 7000-081; 7450-081

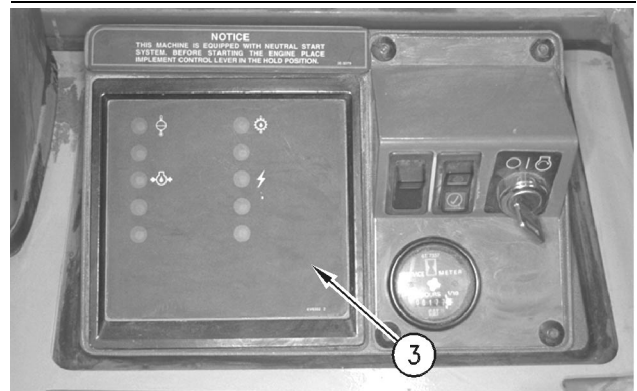


Illustration 286

g00509099

1. Look for broken lenses or indicator lights in EMS panel (3). Start the engine.

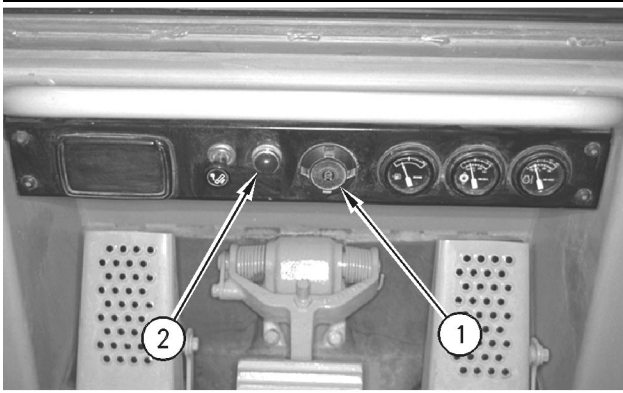


Illustration 287

g00509098

2. Check the operation of the Electronic Monitoring System. Move EMS test switch (2) to the ON position. Fault alarm (1) should sound. The fault light and all of the EMS indicators should begin to flash. The fault light and the EMS indicators will continue to flash until the EMS test switch is released.

Turn on all of the machine lights. Check for proper operation. Sound the forward horn.

Stop the engine.

Make any necessary repairs before you operate the machine.

i01028613

## Loader Linkage Pins - Lubricate

**SMCS Code:** 6118-086-PN

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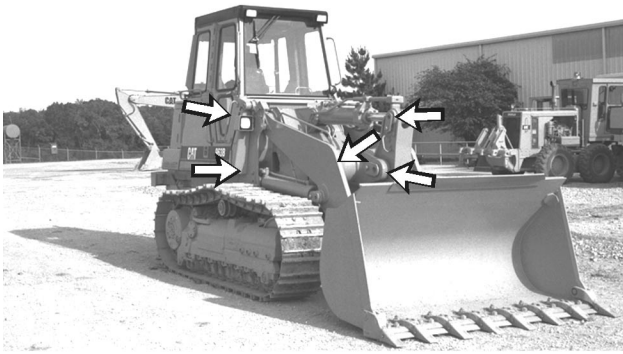


Illustration 288

g00529741



Illustration 289

g00529742

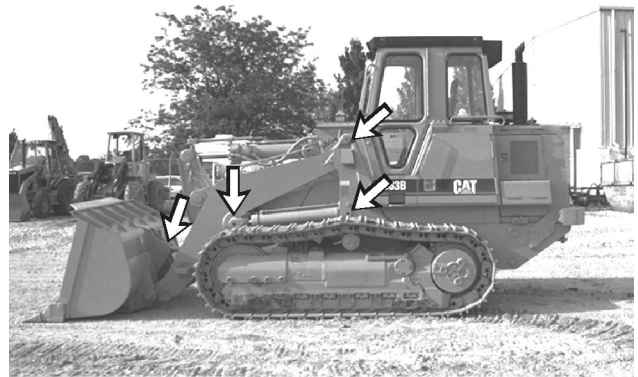


Illustration 290

g00529743

Lubricate eleven fittings.

i00649279

## Multipurpose Bucket - Lubricate

**SMCS Code:** 6104-086

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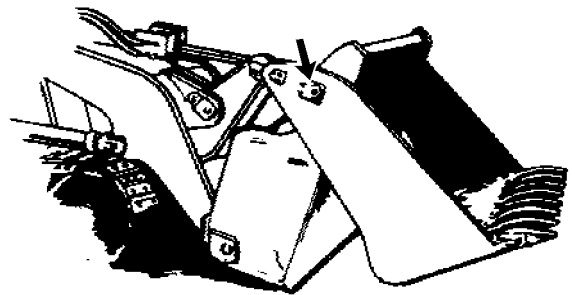


Illustration 291

g00289095

Apply lubricant through one fitting on each side of the bucket.

There is a total of two fittings.

i00649305

## Oil Filter - Inspect

**SMCS Code:** 1318-507; 3067-507; 5068-507

### Inspect A Used Filter for Debris

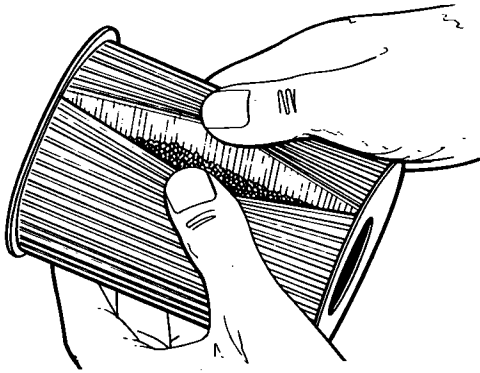


Illustration 292

g00100013

The element is shown with debris.

Use a **4C-5084** Filter Cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe damage to the engine and/or the hydraulic system. Engine bearings, the crankshaft, pumps, valves, cylinders and other parts may be damaged. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

## Pivot Shaft Oil Level - Check

**SMCS Code:** 4153-535-FLV

### **WARNING**

Hot oil and components can cause personal injury.

**Do not allow hot oil or components to contact skin.**

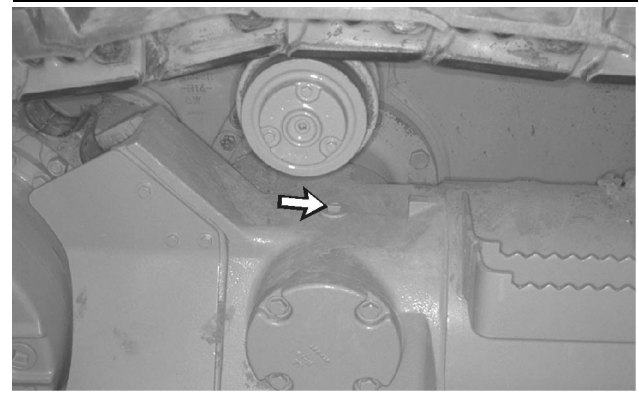


Illustration 293

g00514516

The oil plugs are located on both sides of the machine.

Remove the plug on one side of the machine. Check the oil level. Maintain the oil level within 13 mm (0.5 inch) of the bottom of the filler plug opening. If necessary, add oil.

Repeat the procedure on the other side of the machine.

i01033578

## Pump Drive Oil - Change

**SMCS Code:** 3108-044-OC



Illustration 294

g00518349

1. Open the front access door that is on the right side of the machine behind the operator's compartment.

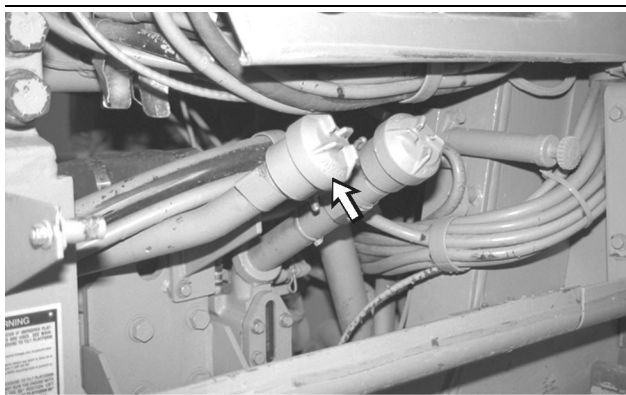


Illustration 295

g00691065

2. Slowly remove the oil filler cap in order to relieve any pressure.

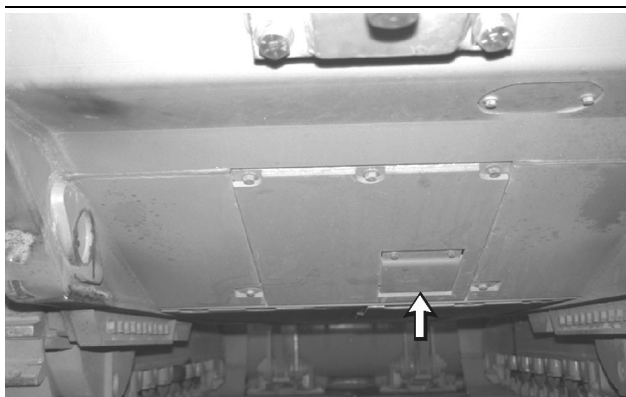


Illustration 296

g00513569

3. Remove the crankcase drain access cover, which is in the crankcase guard.
4. Remove the pump drive drain plug. Allow the oil to drain. Clean the drain plug and install the drain plug.
5. Install the crankcase drain access cover.
6. Fill the pump drive housing with the correct amount of oil. Refer to Operation and Maintenance Manual, "Refill Capacities" for additional information. Clean the oil filler cap and install the oil filler cap.
7. Close the access door.

i01028387

## Pump Drive Oil Level - Check

SMCS Code: 3108-535-FLV



Illustration 297

g00518349

1. Open the front access door that is on the right side of the machine behind the operator's compartment.

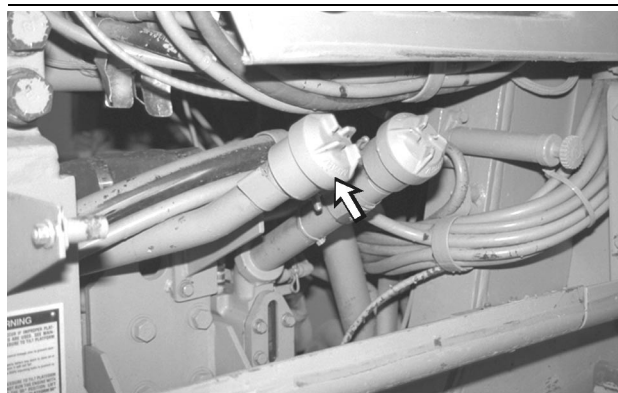


Illustration 298

g00691238

2. Slowly remove the oil filler cap in order to relieve any pressure.

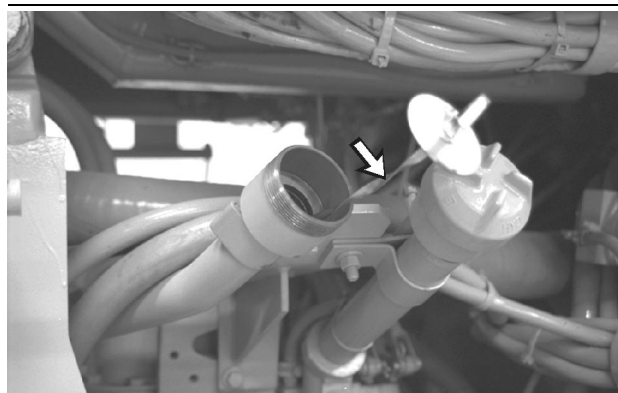


Illustration 299

g00691239

3. Maintain the oil level between the LOW and the FULL marks on the dipstick. If necessary, add oil.
4. Clean the oil filler cap and install the oil filler cap.
5. Close the access door.

i01027309

## Radiator Core - Clean

**SMCS Code:** 1353-070; 1805; 1810

i00768727

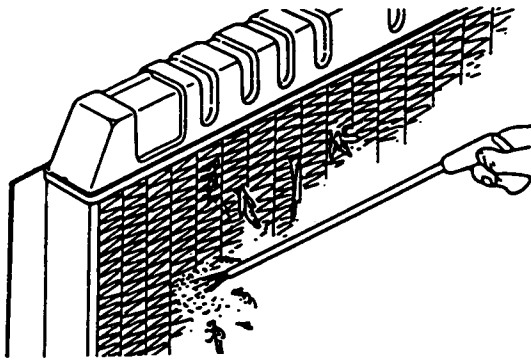


Illustration 300

g00351807

Compressed air, high pressure water or steam can be used in order to clean the radiator. Clean the dust, tree leaves, and debris from the radiator core. Clean the radiator when you determine that the condition of the radiator necessitates cleaning.

The use of compressed air is preferred.

For the complete procedure and instructions, refer to Special Publication, SEBD0518, "Know Your Cooling System".

## Radiator Pressure Cap - Clean/Replace

**SMCS Code:** 1353-070-Z2; 1353-510-Z2



Illustration 301

g00528755

1. Remove the radiator pressure cap slowly in order to relieve the pressure.
2. Inspect the radiator pressure cap for damage, for foreign material, and for deposits.
3. Clean the radiator pressure cap with a clean cloth or replace the radiator pressure cap, if necessary.
4. Install the radiator pressure cap.

i01029751

## Recoil Piston - Lubricate

**SMCS Code:** 4157-086

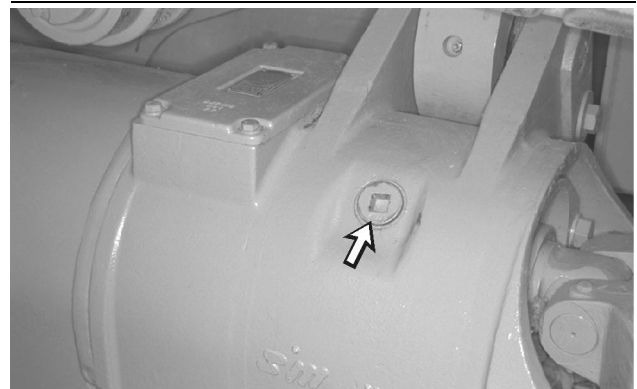


Illustration 302

g00514517

1. Remove the plug in the track roller frame.
2. Connect a grease gun to the fitting. Lubricate the recoil piston through the fitting.

3. Install the plug in the track roller frame.
4. Repeat the procedure for the other recoil compartment.

i01220472

## Ripper Tip and Shank Protector - Inspect/Replace

**SMCS Code:** 6808-040; 6808-510; 6810; 6812-040; 6812-510

When the ripper tip is worn close to the shank, replace the ripper tip. If the tip is too blunt, the tip will not penetrate properly.

1. Raise the ripper. Place blocking under the ripper. Lower the ripper onto the blocking. The ripper should be high enough so that the ripper tip can be removed. Do not place the ripper too high.
2. If the ripper tip is worn, drive out the pin. Remove the tip and the shank pin retainer.
3. Clean the shank pin retainer and the pin.
4. Install the new tip and the retainer.
5. Install the pin from the opposite side of the retainer.
6. Raise the ripper and remove the blocking.
7. Lower the ripper to the ground.

i00682230

## Seat Belt - Inspect

**SMCS Code:** 7327-040

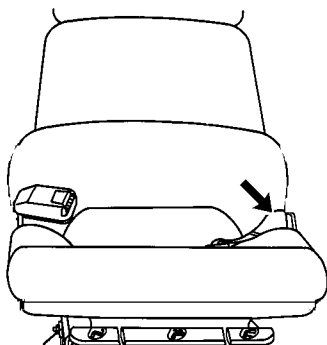


Illustration 303

g00295726

Always check the condition of the seat belt and the condition of the belt mounting hardware before you operate the machine.

Inspect the belt mounting hardware. Replace any belt mounting hardware that is damaged or worn.

Regardless of the appearance, replace the seat belt once during every three year interval.

i01031396

## Steering Linkage - Lubricate

**SMCS Code:** 4318-086

**(S/N: 9BL1-1398)**

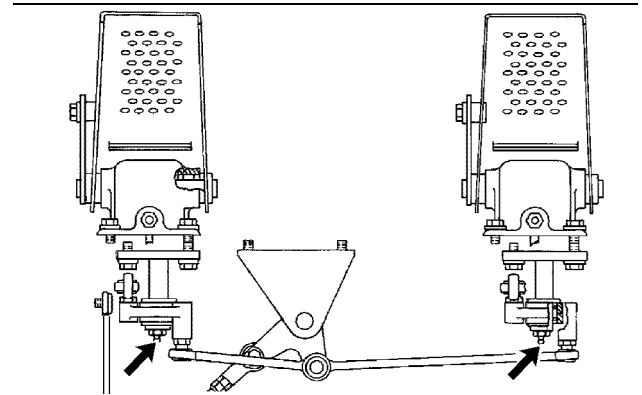


Illustration 304

g00517031

Lubricate two fittings.

**(S/N: 9BL1399-Up)**

The steering control on these machines has been changed. There is no longer a necessary lubrication of the steering control.

i01029644

## Track Adjustment - Adjust

SMCS Code: 4170-025

### WARNING

Grease is under high pressure.

Grease coming out of the relief valve under pressure can penetrate the body causing injury or death.

Do not watch the relief valve to see if grease is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

Loosen the relief valve only one turn.

1. Move the machine forward for a distance of two times the length of the machine. Allow the machine to stop without the use of the service brakes. Shut off the engine. Adjust the tracks while you are in the machine's typical operating conditions. If packing conditions prevail on the job, the tracks should be adjusted with packing material.

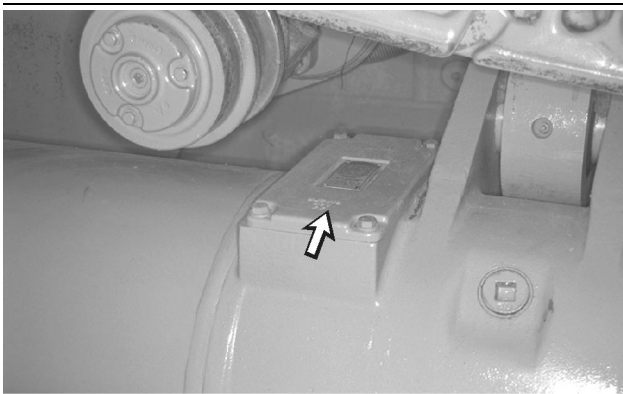


Illustration 305

g00514519

2. Loosen the bolts and remove the cover for the track adjusting mechanism.

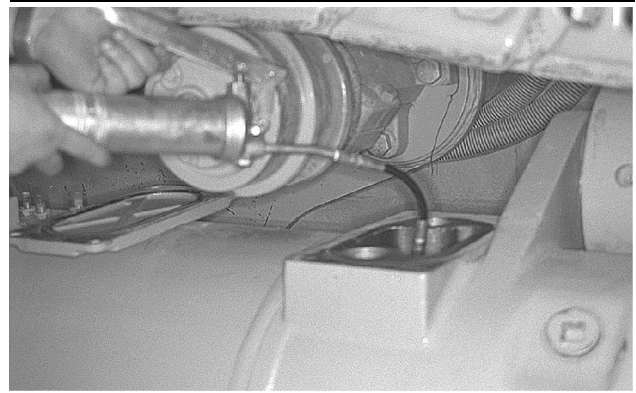


Illustration 306

g00514521

3. Add grease with a grease gun in order to move the idler forward until the track is fully tight.

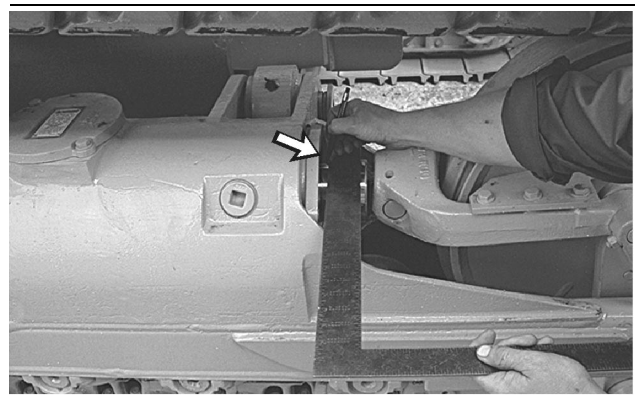


Illustration 307

g00289130

4. Use a straight edge against the face. Mark the rod with a pencil or with a marking pen. Make a mark that is in line with the face.
5. Mark the rod 10 mm (.40 inch) toward the idler from the first mark.
6. Open the relief valve. Allow the idler to move back until the second mark is behind the face. Close the relief valve.
7. Use the grease gun to move the idler forward until the second mark is in line with the face.

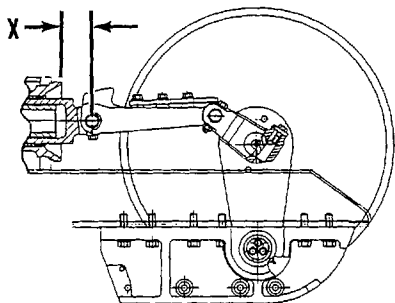


Illustration 308

g00484870

8. Measure dimension (X), as shown above. Dimension (X) is the distance from the face of the bulkhead to the center of the pin in the yoke. If dimension (X) is less than 138 mm (5.4 inch), proceed to Step 9.

If dimension (X) is greater than 138 mm (5.4 inch), the front idler must be moved forward to a secondary position. Refer to Power train Disassembly and Assembly, SENR5367, "Track - Adjust" for this procedure.

9. Install the cover and tighten the bolts to a torque of  $75 \pm 15 \text{ N}\cdot\text{m}$  ( $55.50 \pm 11 \text{ lb ft}$ ).
10. Repeat Step 2 through Step 9 for the other track.

## Bolt Torque for Track Shoes

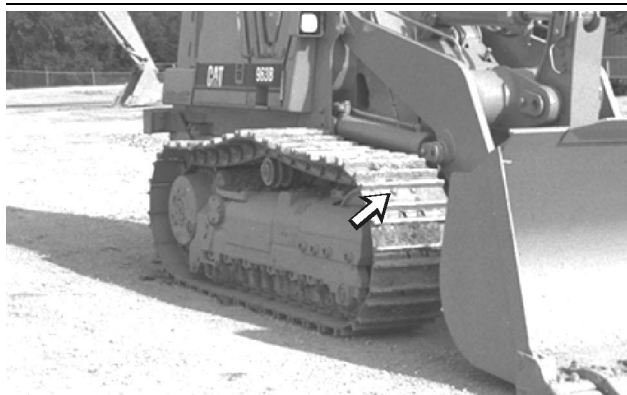


Illustration 309

g00530297

The torque requirement for track shoe bolts is  $170 \pm 40 \text{ N}\cdot\text{m}$  ( $120 \pm 30 \text{ lb ft}$ ). Tighten the bolts for an additional 120 degrees. If you are using bolts with a master link, tighten the bolts to a torque of  $170 \pm 40 \text{ N}\cdot\text{m}$  ( $120 \pm 30 \text{ lb ft}$ ). Tighten the bolts for an additional 180 degrees.

i01034072

## Track Adjustment - Check

SMCS Code: 4170-535

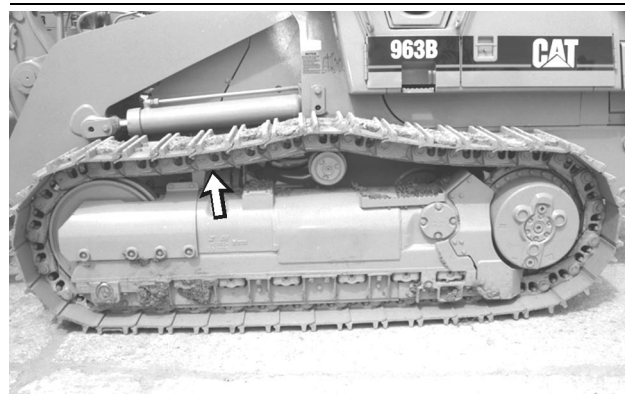


Illustration 310

g00529110

Check the track adjustment. Check the track for wear and for excessive dirt buildup.

If the track appears to be too tight or too loose, see Operation and Maintenance Manual, "Track Adjustment - Adjust".

i01123943

## Track Pins - Inspect

SMCS Code: 4175-040-PN

### WARNING

Fingers can be burned from hot pins and bushings.

The pins and bushings in a dry joint can become very hot. It is possible to burn the fingers if there is more than brief contact with these components.

Use the recommendations in order to extend the life of the undercarriage. Use the recommendations in order to avoid excessive downtime.

1. During the machine operation, listen for unusual squeaking and for unusual squealing. This can indicate a dry joint.
2. Check the machine for dry joints weekly. Check for dry joints immediately after machine operation. After machine operation, lightly touch the end of each track pin or bushing. Touch the track pin or the track bushing with the back of your hand. Make a mark on any dry track pin joint that is very hot to the touch.



3. Do not hit the ends of the track pins with a sledge hammer in order to loosen the track joints.

#### NOTICE

Striking the end of a track pin introduces a significant amount of end play into the track joint and can result in early failures.

Consult your Caterpillar dealer's Custom Track Service expert if you detect dry joints or leaks. Your Caterpillar dealer's Custom Track Service expert can perform track inspection.

i01034291

## Track Roller Frame - Inspect

**SMCS Code:** 4151-040



Illustration 311

g00532999

Inspect the track roller frame for leaks.

i01027709

## Walk-Around Inspection

**SMCS Code:** 7000-040

#### NOTICE

Accumulated grease and oil on a machine is a fire hazard.

Remove debris with steam cleaning or high pressure water, at the specified interval in the Maintenance Interval Schedule or each time any significant quantity of oil is spilled on the machine.

**Note:** Watch closely for leaks. If you observe leakage of any kind, find the source of the leak and correct the leak. Check the fluid levels more frequently.



Illustration 312

g00529097

- Inspect all of the attachments for damage or for excessive wear. Repair the attachments if the attachments are damaged.
- Inspect the attachment cylinders and the attachment control linkage for damage or for excessive wear. Repair any damage.
- Inspect the lights for broken bulbs and for broken lenses. Replace any broken bulbs and any broken lenses.



Illustration 313

g00529104

- Remove any trash buildup around the engine. Remove any trash buildup that is under the floorplate. Also, remove any dirt buildup that is on the top of the crankcase guard.
- Inspect the cooling system for leaks and repair any cooling system leaks. Check the hoses, the radiator fins, the radiator cap, and the drain area.
- Inspect the precleaner screen for any dirt buildup and for debris buildup. Remove any dirt or debris.
- Inspect the engine compartment for leaks and repair any engine compartment leaks. Check around all seals and around all covers.

- Inspect the condition of the steps and of the handholds. Inspect the steps and the handholds for cleanliness. If necessary, repair the steps or clean the steps. Inspect the Rollover Protective Structure (ROPS) for damage. Inspect the Falling Object Protective Structure (FOPS) for damage. Consult your Caterpillar dealer for any necessary repairs.



Illustration 314

g00529108

- Inspect the hydraulic system for leaks. Repair any hydraulic system leaks. Inspect the hoses, the seals, and the flanges.
- Inspect the final drive for leaks. Repair any final drive leaks.

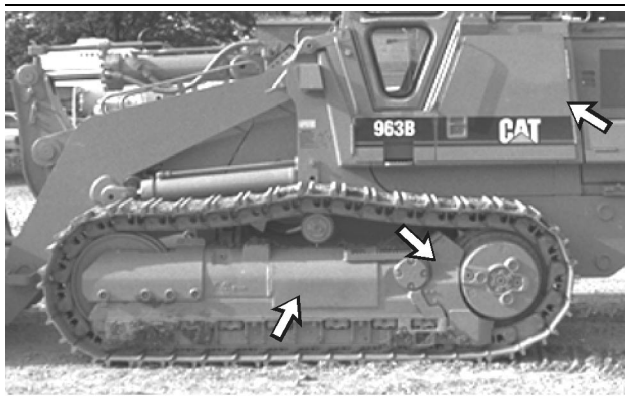


Illustration 315

g00529109

- Make sure that the covers and the guards are secured. Inspect the covers and the guards for damage, for loose bolts, and for missing bolts.
- Inspect the transmission for leaks. Repair any transmission leaks. Check around the seals and around the covers. Also, check the hoses around the transmission.

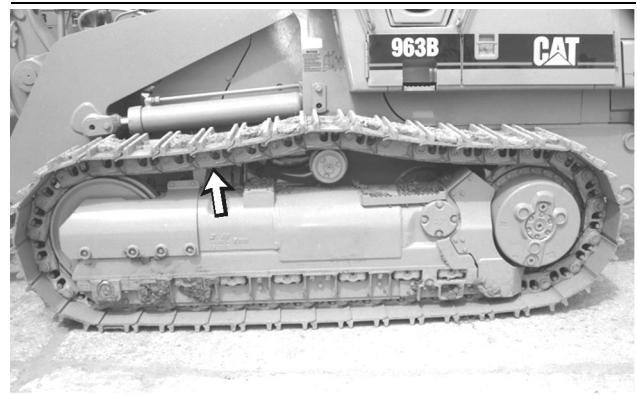


Illustration 316

g00529110

- Inspect the tracks. Repair the tracks if the tracks are damaged or excessively worn. Tighten any loose bolts. Replace missing bolts. Check the tracks for excessive dirt buildup. Check the tightness of the track. Refer to Operation and Maintenance Manual, "Tracks".
- Check for loose bolts or for missing bolts. Check the track components for damage and for wear.
- Inspect the operator compartment for cleanliness. Remove any trash buildup and any dirt buildup.
- Inspect the instrument panel. Repair any broken gauges and any broken lights.
- Make sure that the horn, the backup alarm, the lights, the guards, and the shield are working properly.

i01029383

## Water Pump Belt - Inspect/Adjust/Replace

**SMCS Code:** 1357-025; 1357-040; 1357-510



Illustration 317

g00529104

i01028126

1. Open the rear engine compartment access door that is located on the left side of the machine.

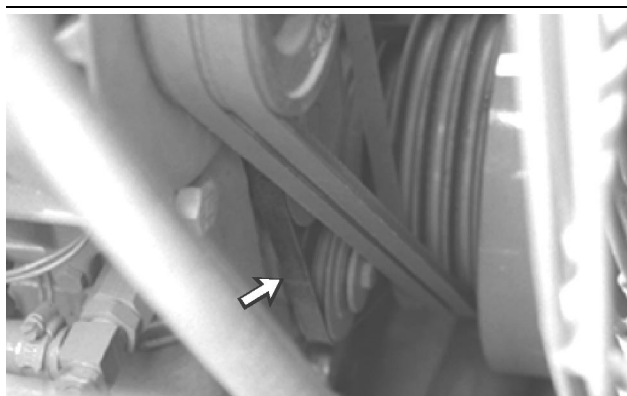


Illustration 318

g00530210

2. Inspect the condition of the water pump belt. Measure the belt deflection. The belt should deflect 13.0 to 19.0 mm (0.50 to 0.75 inch) under 110 N (25.0 lb) of force.

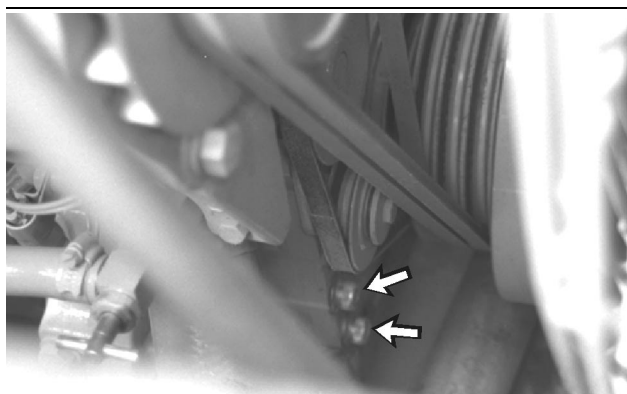


Illustration 319

g00530207

3. Loosen the two bolts. Slide the adjusting pulley until the correct belt tension is reached.
4. Tighten the two bolts to a torque of 50 N·m (37.0 lb ft).
5. If a new belt is installed, check the belt adjustment after 30 minutes of engine operation.
6. Close the access door.

## Windows - Clean

**SMCS Code:** 7310-070; 7340-070



Illustration 320

g00529298

Use a commercially available window cleaning solution in order to clean the windows. Clean the outside windows from the ground, unless handholds are available.

i01305551

## Window Washer Reservoir - Fill

**SMCS Code:** 7306-544

### NOTICE

When operating in freezing temperatures, use Caterpillar or any commercially available nonfreezing window washer solvent.

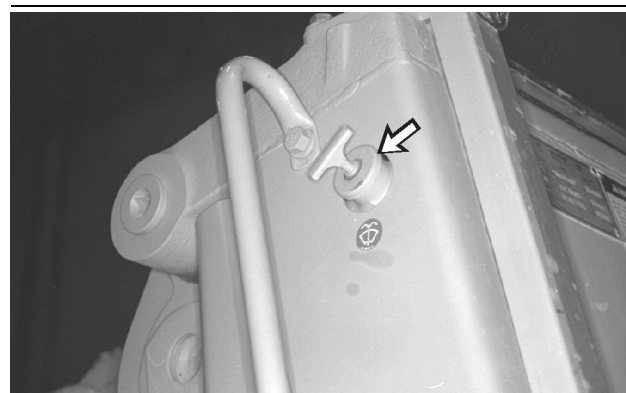


Illustration 321

g00514526



**Windshield Washer** – The washer fluid bottle is on the left side of the machine near the operator's compartment. Remove the fluid bottle cap in order to fill the washer fluid bottle.

i01305559

## Window Wipers - Inspect/Replace

**SMCS Code:** 7305-040; 7305-510

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Illustration 322

g00529040

Inspect the condition of the windshield wiper blades. Replace the windshield wiper blades if the windshield wiper blades are worn or damaged. If the windshield wiper blades streak the windshield, replace the windshield wiper blades .